

Introducing Turbo Basic, the highspeed BASIC you'd expect from

Borland! It's the BASIC compiler you've been waiting for. And it's so fast that you'll never have to wait

again. Turbo Basic is a complete development environment; it includes a lightning-fast compiler, an interactive editor, and a trace debug-

ging system.

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With Turbo Basic your only speed is "Full Speed Ahead"!

You probably already know us for both Turbo Pascal" and Turbo Prolog." Well, we've done it again! We created Turbo Basic.

because BASIC doesn't have to be slow.

In fact, building fast compilers is a Borland speciality, both our Turbo Prolog perform all their rivals by factor, and with Turbo Basic, we're proud to introduce the first high-speed BASIC compiler for the IBM*PC. If BASIC Budght you how to walk Turbo Basic will teach you how to run!

The Critics' Choice

4.8 Borland has succeeded in stretching the language without weighing us down with unnecessary details . . . Turbo Basic is the answer to my wish for a simple yet blindingly fast recreational utility language . . The one language you can't forget how to use, Turbo Basic is a computer language for the missus, the masters, the masses, and measures.

Borland's Turbo Basic has advantages over the Microsoft product, including support of the highspeed BOB7 math chip.

John C. Dvorak 77

Steve Gibson, InfoWorld

Turbo Basic ends the basic confusion

There's now one standard:

Turbo Basic.

It's fast BASICA-compatible, and because Turbo Basic is a Borland product, the price is right, the quality is there, and the power is at your injectips. You see, Turbo Basic's part of the fast-growing bodient Banily of programming Family." Hundreds of thousands of uses are already using Borland's languages, so you can't go wrong. So join a whole new generation of smart IBM PC users—get your copy of Turbo Basic today. You get an easy-to-read 30°P page.

an easy-to-read 300+ page manual, two disks, and a free MicroCalc spreadsheet—and an instant start in the fast new world of Turbo Basic. All of this for only \$99.95—Order your copy of Turbo Basic today!

Free spreadsheet included,

complete with source code!

Yes, we've included MicroCalc, our sample spreadsheet, complete with source code, so that you can get started right away with a "real program". You can comple and run

A technical look at Turbo Basic

- ✓ Full recursion supported

 ✓ Standard IEEE floating-point
- format

 Floating-point support, with full

 8087 (math co-processor)
 integration Software emulation if
 no 8087 present
- ✓ Program size limited only by available memory (no 64K limitation)
- variables

 Full integration of the compiler,
 editor, and executable program,
 with separate windows for
- editing, messages, tracing, and execution

 Compile, run-time, and I/O errors place you in the source code
- place you in the source code where error occurred New long integer (32-bit) data
- type

 Full 80-bit precision
- Pull-down menus

System requirements

AM PC, XT, AT and true compatibles, PC-DOS (MS-DOS) 2.0 or later. One floppy drive, 259K.



Turbo C: The fastest, most efficient and easyto-use C compiler at any price

Compilation speed is more than 7000 lines a minute, which makes anything less than Turbo C an exercise in slow motion. Expect what only Borland delivers: Quality, Speed, Power and Price.

Turbo C: The C compiler for amateurs and professionals If you're just beginning and

you've "kinda wanted to learn C," now's your chance to do it the easy way. Like Turbo Pascal, Turbo C's got everything to get you going.

If you're already programming in C, switching to Turbo C will considerably increase your productivity and help make your programs both smaller and faster. Actually, writing in Turbo C is a highly productive and effective method-and we speak from experience. Eureka: The Solver and our new generation of software have been developed using Turbo C.

Turbo C: a complete interactive development

environment Free MicroCalc

Like Turbo spreadsheet Pascal and th source code Turbo Prolog.

Turbo C comes with an interactive editor that will show you syntax errors right in your source code. Developing, debugging, and running a Turbo C program is a snap.

Turbo C: The C compiler everybody's been waiting for. Everybody but the competition

Borland's "Quality, Speed, Power and Price" commitment isn't idle corporate chatter. The \$99.95 price tag on Turbo C isn't a "typo," it's real. So if you'd like to learn C in a hurry, pick up the phone. If you're already using C, switch to Turbo C and see the difference for yourself.

ystem requirem IBM PC, XT, AT and true compatibles PC-DOS INS-DOSI 2.0 or letter One floppy drive 320K

Technical Specifications (V. Compiler One-pass compiler

generating linkable object modules and inline assembler. Included is Borland's high performance "Turbo Linker." The object module is compatible with the PC-DOS linker. Sup ports tiny, small, compact, medium, large, and huge memory model libraries. Can mix models with near and far pointers. Includes floating point emulator (utilizes 8087/80287 if installed)

- MInteractive Editor: The system includes a powerful interactive fullscreen text editor. If the compiler detects an error, the editor automatically positions the cursor appropriately in the source code.
- M Development Environment: A powerful "Make" is included so that managing Turbo C program development is highly efficient. Also includes pull-down menus and windows
- Links with relocatable object modules created using Borland's Turbo Prolog into a single program. M ANSI C compatible
- Start-up routine source code included.
- Both command line and integrated environment versions included

"introductory price-good through July 1, 1987

Sieve benchmark (25 iterations)

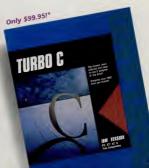
	Turbe C	Microsoft® C	Lattice C
Compile time	3.89	16.37	1390
Compile and link sme	9.94	29.06	27.79
Execution time	5.77	951	13.79
Object code size	274	297	301
Price	\$99.95	\$450.00	\$500.00

Benchmark run on a 6 MHz IBM AT using Turbo C version 10 and the Turbo Uniter version 1.0, Microsoft C version 4.0 and the MS overlay linker version 3.51, Lattice C version 3.1 and the MS object linker version 3.05.

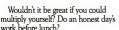
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NEIL J. RUBENKING PIANOMAN, NAMEGRAM

Author Rubenking's goals are straightfo to have fun with computers and get paid for it. So far he is batting 1000. Along with his technical support position he also edits a column in PC Magazine titled Turbo Power User'. His PIANOMAN and NAME-GRAM programs evolved while he was teaching himself Turbo Pascal programming. Finding basic computer tunes "offensive" his PIANOMAN used his musical background as a source to create music on a PC (within the limits of its 2" speaker).

PIANOMAN allows you to: Play your PC keyboard as if it were a piano, Save and edit your tunes, Compile your tunes to a selfrunning program & another option tums your tune

Into a macro for Superkey NAMEGRAM is wild, wacky and is a must for agram (the ability to make a word or phrase from another word or phrase) freaks. After experimenting with algorithms, author Rubenking came up with a

program that would handle any size of input and any size of dictionary.
279 PIANO MAN V3 \$4 1
manager for labels, inventory, and form letters . \$6
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THANKS FOR THE MEMORIES

Have you ever noticed how time seems to change everything? Fashions change. Technology changes. Even the microcomputers we use change. Maybe that's why so many of our customers are saying goodbye to IBM in lavor of a "good buy" from Wells American.

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Freelance Pla on display. page 172.



Charting a Course Through Graphics Software

Cheryl J. Goldberg and Gerard Kunkel/Graphics have always added power to presentations. What's new is that business users everywhere are beginning to use graphics software to harness this power to analyze and communicate data effectively. But the market is still relatively new, and products can run the gamut from the best and the brightest to the defective and the dull. To help you make sense of this evolving market, PC Magazine has devoted this entire issue to graphics software. 113

COVER STORY Graphics Software on

Display Cheryl J. Goldberg and Gerard Kunkel/Do you need graphics simply to analyze data? Or do you prefer a program with which you can create supersophisticated graphics presentations to wow audiences? Your answer will determine whether you should choose a dedicated charting program or an integrated package. We review 44 products, grouping them into four categories: those priced under \$100, from \$100 to \$499, and \$500 and over and integrated packages. 119

Wipes, Pans, and Fade-outs: **Animating Your Business** Graphics Winn L. Rosch/Images created

with charting packages may no longer be enough to hold the attention of jaded viewersyou may have to go that extra mile with presentation graphics packages: Show Partner, PC Storyboard, Concorde, ExecuVision, and Executive Picture Show add impact with special effects such as animation.

Specialized Graphics Software: The Quick and

Clean Solution Glenn Hart/You might be doing yourself a disservice if you're relying on generalpurpose graphics packages to meet your specialized business needs. To create really effective Gantt charts. flowcharts, and text-only charts, you'll need the power of specialized graphics packages like Diagram-Master, Diagraph, EasyFlow, MonoGrafx, OrgPlus, and Sign-Master. 273

Producing Quality Output: When Only the Rest Will Do Robin Raskin/The best way to achieve professional-quality presentations is to use 35mm slides. But how do you turn your graphics creations into these high-resolution images? Film recorders and slide service bureaus are two

options.......289 OThree New Film Recorders Winn L. Rosch/Securing data from prying eyes, fast turnaround time, and longterm savings are three good reasons to invest your dollars in the ImageMaker, the Polaroid Palette Plus, or the PhotoMetric 200PC-all film recorders that can produce slides from images made with

graphics software. 293 ●The Service Bureau Option Robin Raskin/Our survey of slide service bureaus turns up a number of companies that provide efficient service, highquality output, and a reliable alternative to purchasing your own film recorder. 311



FIRST LOOKS

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Cover Image: Gerard Kunkel and Mary Zisk

What's inside



To hear some of the purveyors of presentation graphics tell it, analytical graphics is a dirty word. But the fact remains that for most people, the moving images, musical beeps, and sequenced dissolves that characterize presentation graphics don't matter. What most business users want is a program ness users want is a program

that lets you put numbres into a computer and get pictures out. Most of the 4 apphiss programs reviewed in "Craphiss Software on Display," starting on page 119, allow you to do just that But there were exception. As Cheryl Goldberg, the associate editor in charge, our cover story, recalls, one of the programs nearly reduced a reviewer to tears. Apparently designed to work on a mainframe and then ported over to a PC, this ground user interact was unfabronable to veryone in PC Labs. At this point in everyoning that cornully causiyed writer Phil Wissell said that is called that the program of the programs of the progr

At the other end of the spectrum, we found a program that's so easy to use, it can graph anything any program puts on-screen—even the file sizes of your directories. We don't know why you'd want to do this, but you can

want to do this, our you.com, and are a real temptation, "according to our technical art director, Cerard Kunkel. "Uses got the urgs on on the chincal art director, Cerard Kunkel. "Uses got the urgs on on the good providing that to part everything in the graph—of the control of the graph—of the control of the graph—of the commodifies futures." Kunkel, who along with Goldberg and the lands deviced the testing scenario for this issue, ware that the integrit is the control of the cont

The big surprise here was that unlike word processors, databases, communications programs, and spreadsheets, there are no rock-bottom bargains; you can't get full-featured performance for less than \$200. However, all three Editor's Choice graphics programs are priced in the midrange of \$395 to \$495.

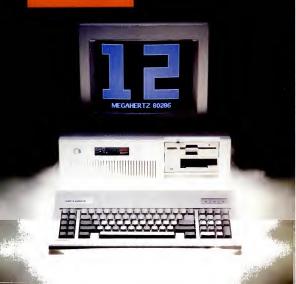
While they're the mainstream, analytical and dedicated charing packages aren't the whole graphics universe. In his special issue, PC Magazine also reviews other graphics categories: animated presentation packages, sign makers, or ganization chart makers, and flowchart programs. And in "Producing Quality Output. When Only the Best Will Do," page 289, we task you from disk files to ultra-high resolution (4,000 lines per inch) boardroom-quality slides and overhead transparencies.

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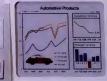




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LETTERS TO **PC MAGAZINE**



AN ASSEMBLY DEBATE

I believe that Bill Machrone's column "The Death of Good Software" (From the Editor's Screen, PC Magazine, Volume 5 Number 20) was way off the mark. Although Mr. Machrone makes several good points, he fails to recognize the opposing

Why wasn't MicroPro able to come up with competitive enhancements to Word-Star. Version 3.3? I'll wager that it was precisely because they wrote the product in assembly code. Assembly code is inherently unmaintainable once the original programmer has left the company. Mr. Machrone confuses corporate confusion and dubious judgment at MicroPro with the issue of assembly language versus high-level language.

Warren Sirota Oakland, California

The only "inherently unmaintainable" code is sloppy, poorly commented spaghetti code-in any language. Much of WordStar's code happens to be so good that legions of nonprofessional programmers have been able to tweak lots of extra performance and features from it .- Ed.

I am responding to your recent editorial, "The Death of Good Software" (From the Editor's Screen).

WordPerfect was originally written in 1980 for a Data General C/300. At that time, we had to be very frugal with memory and cycles so that the accounting department wouldn't complain when Word-Perfect was added to its system. Consequently, we wrote the program in assembly, and it ran in less than 64K bytes of RAM (40K bytes were shared code).

When we started work on the PC ver-

sion, we looked at C seriously. The decision we made to use assembly again wasn't very difficult, since there wasn't a mature version of C on the market in March 1982.

Today we are extremely glad we didn't go to a higher-level language. Our memory requirements are generally lower than those of our competition, and we're generally faster even though we do a lot more formatting on the screen than other word processing products. I admit that we are working on a C version for machines like the NCR Tower, but most of our software will continue to be written in assembly. We will not stop writing "tight, well-written code." I admit that an assembly programmer is part of a dving breed, but at least a few are alive and well.

W. E. Pete Peterson Executive Vice President WordPerfect Corp. Orem, Utah



386: THE JAGUAR OF PCs

Your recent issue on the new 386 machines ("Compag Leads the Way to Speed and Compatibility" and "Intel's 32-bit Wonder: The 80386 Microprocessor," PC Magazine, Volume 5 Number 20) prompted me to write down the following thoughts on the current state of technologi-

cal development in the computer industry: After having the pleasure of trying out the Compaq Deskpro 386, it occurred to

me that owning this machine is like owning a Jaguar. You have a car that can cruise comfortably at 160 mph, but the street system (DOS) is designed for 30 mph. For me, owning a 386 in the foreseeable future will be a frustrating experience. In fact, the 386 salesman told me that the only people buying the new machine now are those who have large databases or who use CAD/CAM systems (the Grand Prix drivers of the industry).

With the advent of the 386 technology, I would hope that software and hardware developers will switch from building features for Volkswagens to building those for modem fuel-efficient cars with many easy-to-use, convenient gadgets that make driving a pleasant experience.

So instead of buying that new Jaguar 386, I am prepared to stay with my old beater or wait until the computer industry produces a useful product that takes full advantage of the 386's speed and memory capacity. If Chrysler could figure this out. I would expect the same from the folks in Silicon Valley.

Grant Wichenko Winnipeg, Manitoba Canada

Bill Howard replies:

The Deskpro 386 gives you superhigh performance today-twice the speed of an AT (and five times that of a PC)-for a fifth more money than for an AT. The 386 lacks only the planned obsolescence of so many other less-forward-looking machines.

Even with their current attention to engineering and quality control, Jags are good for only 140 mph.

Boost cursor speed. Stop cursor run-on

With all the recept hoopla over performan it's ironic that two of the PC's ergonomic deficiencies have been overlooked — its sie cursor, and the lendency of the cursor to emain in motion (run-on) after a cursor key us been released. Finally, the solution — ruise Control¹⁴ from Revolution Software.

Cruise Control is a new productivity tool t perious PC users. It boosts cursor speed, typically by 3-5%. It eliminates annoying cursor run-on. And it adds hands-free If you use 1-2-3, Symphony, dBASE, Refle or Paradox, you need Cruise Control's Ant Skid Braking. Here's what the leader of or Lotus users group said about Cruise Contr

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LETTERS

MOUSE WON'T DO WINDOWS

While looking through the November 25, 1986, issue, I read your reference on the Microsoft Mouse, Version 6.0 (First Looks, page 59, PC Magazine, Volume 5 Number 20), and thought you might be interested to know that there is a bug in this version that prevents Microsoft Windows from booting up. After discovering this conflict, I called Microsoft and they sent me a new driver that fixed the bug.

Bill Lewis

Fort Worth, Texas

The "bug" you discovered is actually a lack of compatibility between the Microsoft Mouse, Version 6.0, and Microsoft Windows, Version 1.01, According to Microsoft, Windows, Version 1.01, does not have the correct mouse driver to accommodate the new InPort chip used with the Mouse 6.0. However, the latest release of Windows, Version 1.03, does have the proper driver to run with the Mouse. Microsoft suggests that users of both Windows 1.01 and the Mouse 6.0 either upgrade to Windows 1.03 or request the new mouse driver, as in Mr. Lewis's case. Microsoft will ship the driver at no charge to registered users.-Ed.

VICTOR MISSED THE BOAT

Your friend Victor has missed the boat (Stephen Manes, PC Magazine, Volume 5 Number 21). The big software companies have already convinced us to buy second, third, and fourth programs-all with the same name as the first.

The day I read Victor's advice, I got a letter from Microsoft. Finally, I thought, they're going to tell me why Microsoft Word, Version 3.0, doesn't run correctly on my dual-floppy disk, 256K-byte IBM PC. How naive can one be!? Of course, Microsoft's letter was not in response to my inquiry, but a sales pitch for Word, Version 3.1. Even PC Magazine can't keep up with the versions, for you reviewed the now-outdated Word 3.0 in the same issue ("Triple Crown: New Editions of Three Winning Word Processors").

Perhaps Victor would like to wager some of that venture capital on whether the original problems were fixed with this latest version, or on whether Microsoft will answer my letter before the next version of

Word appears. C'mon, Victor! Since your venture has already been anticipated, you need something to do with that money. J. R. Myers

Baltimore, Maryland

SQUARENOTE SQUARED AWAY While it may be a bit ungracious to nitpick



about a review in which our product was an Editor's Choice ("TBMS: Database Power Unleashed." PC Magazine, Volume 5 Number 20), the review of our SauareNote seems to imply that it is in-

fact, as it is primarily a keyword-oriented system, SquareNote provides Boolean selection on keywords as its main retrieval

We'd also like to mention that the review was based on an earlier version than the one we're currently shipping, which

has instantaneous help screens and improved import and export. Lucy A. Lynch Union Squareware Somerville, Massachusetts

READING BETWEEN THE LINES I read with great amusement Stephen Ma-

nes's egocentric column entitled "You Get What You Pay For?" (PC Magazine, Volume 5 Number 20). Though it was written in the hypothetical, it was not difficult to read between the lines.

As a potential user of SquishySoft's MaxiTool, I was delighted to see just how far a contributing editor of PC Magazine is willing to go to assist the software industry in improving its offerings to the public. After all, we can't have writers, lawyers, and so forth, who hold the public trust, volunteering their time to improve the general welfare. Imagine, if any writer for PC Magazine (all of whom are regarded as experts in the field) were to help a software publisher while he was trying to develop an application, it might work correctly the first time. Then where would we be? Why. there would be no more reviews with snide comments about how inadequate a new re-

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■ LETTERS

lease is, and no more editorials on how disappointing the software industry is as a whole.

Then the next thing you know, we'll have renowned biochemists giving away their patent rights to polio vaccines for only a dollar (which is an excellent example of getting what you pay for). Just think of the millions of people who are still waiting to receive what they paid for from Jonas Salk's uncommensated time.

Thomas S. Danford Orlando, Florida

Stephen Manes replies:

Everybody on this publication's masthead has spent hundreds of hours gladly proffering free advice. But there's a limit: presentation graphics programs are not quite in the same league as polio shots.

If the altraistic Mr. Dauford seriously believes Dr. Salk did his pioneering workends in his dank, candleft bassement lab without financial compensation of any sort, perhaps he'd be interested in purchasing from me a rure cherrywood fragment heen by the young George Washington. Nah! On second thought, he'd probably want for free.

A PIECE OF MY MIND

In his column "What's on Steven Jobs's Mind?" (PC Mogacine, Volume 5 Number 20), Stewart Alsop claims that everyone will want a desktop publishing system in a few years. He stops just short of implying that these will be the only personal computers available at that time!

I would like to say that if anyone astempts to saddle me with such a system I will walk straight out the door. The last thing that businesses need and want for the majority of their employees is to have them waste time worrying about the physical appearance of the printed page. Yes, desktop publishing is great for people responsible for producing newsletters, but a revolution? I sincerely hope not.

> Warren Sirota Oakland, California

Stewart Alsop replies:

Mr. Sirota misunderstands what I was trying to say (probably because I could have said it better). The true significance of desktop publishing is not so much the abili-

ty to create designed documents that anpear to have been professionally produced and typeset. I don't use a page composition program at all, but I do use fonts, highlighting, and laser printers. None of this slows down my computer or my work; all of it helps other people understand what I'm saving. Indeed, the significance of desktop publishing is that it makes all documents-sales reports, financial forecasts, rough drafts, memos-communicate more effectively. I'm sure that Mr. Sirota needs to communicate effectively on his job, and if, as I speculated in my colunn, he were able to enhance his documents on-screen and then deliver them without modification, his effectiveness as a communicator would be improved. Since most of our work involves communicating with other people, that would seem to me to be the first thing that businesses would

want their employees to worry about. CORRECTIONS/AMPLIFICATIONS

In the sidebar "Tales of Many LANs"
("Connectivity: LANs and Beyond." PC
Magazine. Volume 5 Number 21. page
120), the line "McGill has six of Sandard
Microsystems Corp.'s ARCnet
LANs..." should read "McGill has six
of Pure Data's POI508 ARCnet
LANs..."

The correct address for Pro/Tem Software, maker of Notebook II ("TBMS: Database Power Unleashed," PC Magazine, Volume 5 Number 20), is 814 Tolman Dr., Stanford, CA 94305.

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If you use Lattice C96" or Wasard and have 320k, you can compile your C

ogram without ever leaving Brief it finds the lines with errors and marches was through the text for repairs Parts of Brief were warren with its own Lep-like macro language which has structure. 32 character vanable nam conditional execution, loops, and you can actually read if Nothing like the hieroglyphs we've seen elsewhere Bulletin macros. "Semply the best text editor you can buy." Distrak Informatid (Needs 190k.)

Call HALO GRAPHICS

SYSTEM Multi-Board ics Library The premier graphics library that got the ball rolling for PC-based graphics and has grown so ommpotent that it supports over 25 graphins board. 25 graphics boards — including IBM's EGA and Nr 9 Revolutions haves series and has a multitude of mouse and printer drivers. All that in each box. Separate C wersons for Lattice, M'not. Aziez, C186 What does Multi-Haio do? A down to the last posel graphics library plus functions to reset drivers so distributed program can run on anything. Wonderful value for single

hoense. Costly royalties though for

redistribution Specify S036 & Language Last 1900, We 1219, With Dr Halo ff, a free

standing "paint" Let 440, Us 1299.

WINDOWS for C/WINDOWS for DATA Microsoft Windows™ and TopView™ Compatible

W indows for C^{ms}is a labrary of over 80 functions to add the passiz and practreality of window partitioning to your application Unlimited windows, each defined in a C structure for easy reference throughout your program can be made either to pop up or permanently overwrite the screen Routnes will scroll and highlight lists with arrow keys will read and scroll ASCII files wertically and memory loaded files of the screen Logical treatment of video attributes rats unchanged programs to run or

color or monochrome. Colors of windows are set indrodually re set individually.
All functions are in separate modules, nly those used are linked. Only buffers obscured wandows occupy RAM, others released dynamically. Best overall rating and fastest display in Bill Hunt's 7/85 Tech mal review of five windowing products

Windows for Data comprises all of Windows for C but takes in data through the windows as well. At the high level a single function lets you specify prompt string, field length data type screen location, picture, target variable, then sets lesser functions scurrying to get and process a user's input. There are utilities to get system date and time, mess with strings, crease your own masks for fields Field options can require entry prevent entry reems used or overtype begoing valid or overflow keystrokes, and arractment of field-specific help messages

C-TREE B-Tree File Manager, Source Code, No Royalties!

C tree is sturdy code that has weathered many seasons of pro longed and widespread use it comes in C source so you can modify a to fit a special case. No rovaities provided you bind it into your binary application number of users to access an index file simultaneously even when updates are in progress. So multi-user configurations and networks are possible cord locking rounnes are provided for

dBC Lattice Library Maintains dBASE Compatible Files With the Power and Speed of C

d BC™ links C to dBASE it creates and manna, is files and their indexes which exactly replicate dBASE file design. So dBASE can read and update them. And the reverse dBC can use any ties created by dBASE. Now C and dBASE can operate on the same data bases interchangeably dBASE installations to exploitation by C programmers. Tap that market, avoid the resident dBASE language, and gain the advantages of C with this single product dBCs functions parallel all dBASE's file handling commands, many decomposed to give closer control. Each backed by

demo source files on disk

Use dBC for custom work for cheets, or on as own. It's a complete ISAM file manager for C whether or not dBASE will be used in tandem, supports all four memory models, and can have someon index and data files open Big discount to buyers of both dBASE II and III vensors. Specify Lance. Microsoft 3x or DeSmet

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and functions you want called to displidecide which laves will clear a field sump to the next or prior, quit, etc. Options drawing enough that a set of "fields" can be made to behave like a Lotus** menu

MICROSOFT C 4.0

A s the dreadnaughts pound each other with ever beaver cednance today's programmers reap the spoils of this war Bundling a source debugger and a "make" and sporting a "buge" memory model permitting single data objects larger than 64k, the Microsoft C compiles as jumped a full version number to But what's really impressive are the bench-marks reported in Dr. Dobbis (8/86) encyclopsedic survey of I7 C compiers. Microsoft's and IBM's C (keensed from Microsoft) run away with the connect wirrung II of 27 benchmarks. The CodeView™ debugger, free for a

irrufed time, uses windows to show every thing on one screen source alongside disassembled object, variables, stack and registers. Drop down windows—use a mouse f you like obvise learning of commands A source-level debugger that puts the rest

DOS 31/32 UNIX and XENIX

denate from the KAR standard. Caree can travel. Tests in many environments prove that Otree gives your application a ticket to anywhere C-tree permiss any number of keys for a data file, supports duplicate longs alphanumenc or numenc, supports files of variable record length, multiple logs in one index file, and keys of variable length Both high level ISAM routines which handle details with minimum coding and decom-



BACK GUARANTEE product returned within 30 days in enarely resolable condition Yo even try out programs them-selves if product code begins with E. TorL through N - even if it means breaking the disk seal Some developers do pose limits so for prodducts beginning with other letters opening sealed disks constitutes acceptance But you can at least review the manual There's put nothing stop ping your buying from PC Brand

A Great C Battle Rages and You're Winning

Microsoft C now has five memory models for code and data, plus non library support for another flurteen, and boasts alternate math packages for speed versus accuracy with or without 8087/80287 chips. A big plus in multi-language settings, call from this C any routine written in later versions of Misoft Pascal, FORTRAN, or Macro Assembler Object code of all four may be intermined come link time of commingled to apparies. Both linker and library manager are part the package, as is the "make", a UNIX[™]

name for a smart batch program which knows to expend minimum effort to rebuild any size of project by compling and assembling only elements affected by new or changed modules. it is reportedly used by Lotus, Ashton-Tage and, fittingly, Microsoft itself to dew

[for] varually any kind of program concervable* 330k suggested Ask for Last PC Brand

CURSES Unix Style Scre

Carses from Lattice™ man of the PC like Unix** curses. Library of 84 functions and macros parallels Unix with marching parameter lists. So Unix pro grams are at home on the PC and vice versa. Keeps any number of screens in memory, supports color, vast function set to or characters, was inscision set incurs set incurs set in set in

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RUN/C PRO C Interpreter Links Binary Libraries

R un/C comes in an apprennice and proversion. The professional model amusally loads and unloads multiple busary function libraries like C-Food Smorgasbord and Halo Graphics nons in the best of commercial interies
This Cinterpreter behaves like PC BASIC
meets WordStar* Use fullscreen editing

meets Wordstar Use Malacreen editing to create a program RUN of it is stambles. LIST it EDIT is RUN it again for a again. Use familiar commands like LOACS MERCE SAVE FILES even TRON and TRACE Ideal for program development. Put up. code at high speed try out things devil may care, let RUN/C find your malionous Biast away until tight little code segments are undwingly fashful

Manual shows how to develop the interface to a commercial library using the Lar tion archive the same way (320k minimum 512k recommended to fit libraries) Ask for S0950 List *250 PCR *185

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Screen Design Aid A complete package for screen design with full windows manage gram from concern for device adaptionacy No one else his amplemented CCL that nent as a bonus' Easy creenon of screens with complex validation such as range checking or required/option al data Powerful Screen Paint utility program will draw a different device CSS Kernel 1º conforms to evel 2b. for creating or editing applications screens Built in security levels, set at ANSIs Oraphical Kernel Sustem (OKS) and run-time, control read or read/write language binding: Kemel has macro low. help screen processing for run-time tools to draw and color an object store the ad per field or screen. Applicanors sequential instructions and recrease the regain control during held tabbing. owand run-time on acreen transaction mand may represent severa, score lower none include Screen Read and Write with automatic transparent data change any field characteristic at run-time plus Washow Push Pop and Scroll Versions for Lamon Microsoft and digrestable display for screen or pioneer

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debugger like that accompanying IBM VS reference compile option supports -assembler and C subsource calls. I floating point 8087 and 8087 chips alis IEFF Computers documentation, ease of usfacilities place if first for recommenda dees for fBM DEC esc for 20 years

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LATTICE C COMPILER Major Upgrades to the Best Selling C Compiler

affice now embraces key UNIX L affice now empracts any units enhancements which have entered the language since KSR void functions. to assign stepped values to variables, date plassing between structures by assignme.
The one-sity expended libraries (QS) functions') enable the file sharing and secord locking provisions of DOS 31 pro-

vide a full complement of transcen and a host of utilities to mirrur the UNIX and XENIX** environments Lattice 30 defaults to the ANSI proposed tandard when you need strict adherence. but command line options regione lenier And a adopts ANSI rhectors of external function arguments by data type to kill bug swarms when modules you up at link time

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Lattice now delivers smaller EXE files boasts very fast link times and a more effi-

cent aliasing eigorithm. New options generate code to use 80(9) and 80286 leanures 8087 of course sensed and unjlong that developers have created far more snap-on tools for Lattice C than am other compiler. Waliam Hun's PC Tech Journal review of 12 computers awarded attice the only 'very good' rating for add-on labrary availability



BETTER BASIC Convert Microsoft BASIC Structured, Compilable,

C ombines the familiarity of BASIC with the best features of C Paical and Modula 2 yet BenerBASIC is 100% com-panible with Microsoft's CWTM BASIC and parties with sacrissors of which can be be seen and and assertibly language calls So load your old programs and RUN SAVE and they are convened auromatically to BenerBASIC. It's big. Needs 192k, programs can go to be PC's full 640k. It's comfv. Behaves Like Misof BASIC at the interactive level with a full-acteen edeor durect statement execution, and always posed to RUN. It's fast

C-like structures house file records so goodbye to FIELD MKIS CVD LSET etc. Named "procedures" replace OOSUBs to numbers Lots more features built in Quality software? EM thinks so 'They set's the CSS series under their own label lanker for computed modules, trace, debug and breakpoints, cross reference con

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Compare this to the ONX O/S. designed by a dedicated team with a common purpose and complete understanding of both the software and the environment in which it must run. Having elegantly solved the problem of Inter-task communications, ONX is more than capable of both networking and real time performance - the superior choice for

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and extensions by software developers for specific requirements. In addition, PC-DOS runs as a single-tasking

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PC ADVISOR



Help in finding the right input device for drawing on your PC and in keeping file fragments in contiguous sectors on your hard disk.

DRAWING WITHOUT A MOUSE

I like the idea of doing sketches on my PC, and so I bought a mouse with PC Paint-brush (from Z-Soft Corp.). The woman who sold it to me drew a beautiful picture with it, but I just can't. Can you give me advice on other input devices? Basically, I want something like a light pen that I can draw with, but I don't see many around.

Charles Dai Richmond, British Columbia Canada

It's not a light pen you want—they're really appropriate only for making selections from a display by touching the pen to the monitor. You want a digitizer pen, which has the right shape for detailed sketching. There are two I can recommend.

Peumouse Phis (Karta Corp., Phoenix, Ariz., (602) 276-553; \$295) is cordless. Itsservado vaves to sead signals from the pen to an 8½-by 11-inch digitizing tobles; the tablet connects to a PC serial port. Since it can emulate the Microsoft Mouse, Permouse Plus will rua PC Paintbrush and a wide range of programs also compatible with the Microsoft Monse.

Mare-detailed drawings are possible with SummaSter (Summa Graphics, Fairfield, Comn.; (203) 384-1344; \$595), which connects to a digitizing tablet via wire. Because it doesn't house a radio transmitter, it's lighter than the cordless Pennonsee Plus. Also to be considered: it inputs at a resolution of 1,000 dots per inch (Pennonsee Plus works at 200 dajs), so you can have more highly deflued drawings stome people perfer a lover dai be-

cause it's more forgiving: higher resolution demands higher accuracy). SiamnoSketch won't emulate a mouse but comes with a four-button cursor that does.

AVOIDING FILE FRAGMENTATION
When I used only floppy disks, I used
to check them from time to time with
CHKDSK *.* to determine if segments
were contiguous. When a disk had more
than five noncontiguous segments, I
would copy to another disk and reformat, I
was advised that this was the way to handle
fragmentation. I can't get the same effect
on my new hard disk. Perhaps fragmentation
tion is not a noblem on the hard disk.

Leonard Nadler College Park, Maryland

File fragmentation is even more of a drug on access speed on a hard disk. Disk Optimizet (Soft Logic Solutions, Manchester, N.H.: (800) 272-9900; \$59.95) was the

 Power Tools offers not only disk optimization but individual file defragmentation as well. It also includes a file finder. first utility created to solve the problem, and it's still the most popular.

A newer product affers not enit disk opnituation but hidwals file defiquational file and initiation but hidwals file defiquation file as well. It's called Power Tools (ML) (617) 879-2000; SSS), and in its bag of tricks it ados incluses utilities for file related letion and a file finder. People who don't of their hardware are best served by Dss. want to be bothered with the archaedred with the optimizer, that since you seem to be fissly attuated to your PC's health you'd probable by be here of you'll power Tools.

TAKING A MEGABYTE OUT OF THE ADVISOR'S CREDIBILITY In your column on 31/2-inch drives (Vol-

ume 5 Number 21), your reply states that the drives are rated at 720 megabytes. I know this would be nice, but isn't it supposed to be 720 kilobytes? If it is 720 megabytes, where do I sign up to get one?

Wally Young Placentia, California

As soon as I hear of one, I'll let you know. For now, we'll all have to live with 720Kbyte drives, and I'll have to try and live this

one down.

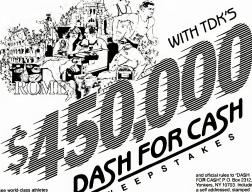
But when fact follows fiction, there's usually not much of a time lag—some disk makers are developing 3½-inch drives capable of storing 20 or 30 megabytes.

ASK THE ADVISOR

Send your questions to the PC Advisor, PC Magazine, One Park Avenue, New York, NY 10016.

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CIRCLE 173 ON READER SERVICE CARD



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"AST's Premium Ser Flexibility In

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Tony has talked about his





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Borland Builds Speed, Power into Turbo Basic

HANDS ON BY ETHAN WINER

With the release of its eagerly anticipated Turbo Basic, Borland International has created the most powerful version of BASIC ever

More than just another "me too" in the current proliferation of advanced BASICs, Turbo Basic offers some features which are truly revolutionary. Of course, line labels are supported, as well as multiline ifthen-else clauses, procedures, and local variables. But Turbo Basic takes these now-standard features and then adds a number



of additional capabilities.

To begin with, it supports the 8087/80287 numeric coprocessor, a wider range of array subscripts, and recursive procedures and functions. Not content to stop there, however. Borland has also added a terrific binary mode for file I/O, a case/select structure, long inte-

gers, and named constants. Like Turbo Pascal, Turbo Basic provides a complete, selfcontained environment in which program source files are creat-

ed, edited, and tested. Separate windows are used for editing, program output, tracing a program's execution,

EasyTax Turns 1-2-3 into A Federal Tax Preparer



PE HANDS ON

BY LAURA LOU MEADOWS For 1-2-3 lovers, the template's the thing. As the season of the Form 1040 is almost upon us, EasyTax is the template that transforms 1-2-3 into a screen that looks like Uncle Sam's

most popular form Used with 1-2-3 FasyTax also does 18 other forms and schedules and has a 3-year tax planner. After you've done your return, the EasyTax Analyst of your tax calculations with government statistics of other taxpayers in your bracket and will let you know how your deductions stack up with the average. Then it tells you the percentage of returns in your bracket that get audited.

tion. Function keys move you through the windows.

If you are already proficient with 1-2-3, you're probably to the point in which the learning time for the Easy Tux template is minimal. After you've made a working copy of the template program and breezed through

the start-up instructions on the disk that summarizes the small instruction manual, you are ready to start filling in the Form 1040 right on-screen in the same way you would fill in the paper version that comes in the mail.

The EasyTax labels and formulas are worked out so that any item of information entered in one form can be integrated into all the other forms in which it is needed. You go from one form to another by typing F5 and the schedule or form letter

tinues on page 34)

HANDS-ON INDEX

THE TAX ADVANTAGE Menu-driven 1040 35 CEL FRRITY A \$90 word processor 36 **DAC-EASY BASE** A DBMS for \$49? 38 SHARP PC-7100 CLIPPER, AUTUMN '86 Network, EMS support ... 46 LEARNING DOS From the masters48

A handle on DOS........... 52 SPREADSHEET DETECTIVE

Turbo Basic (continued from page 33)

and other system functions. Matching Borland's lively interface standards, these windows may be turned on and off or zoomed in and out

Fast Screen Writes One of the first things you'll

notice is Turbo Basic's ultrafast screen output. Turbo programs automatically adjust to the type of adapter that is installed in the host PC. Then, rather than call upon the BIOS to display text, special routines write directly to screen memory at the fastest possible speed.

Screen output isn't the only thing that's fast. Written entirely in assembly language, Turbo Basic compiles faster than anything I have seen. What's more, the programs it creates execute faster than those produced by other compilers.

Using Quick Sort on a random 5,000-element floatingpoint array, Turbo Basic took 2 seconds to create the array and 16 seconds to sort it. Microsoft Corp.'s QuickBASIC, Version 2.0, came in far behind at 6 and 135 seconds, respectively.

In another test, Turbo Basic compiled a 1,200-line program to disk in 24 seconds, as opposed to over 30 seconds for OuickBASIC. And note that the EXE files that Turbo Basic creates are true standalone pro-

step is required, extremely large source files may be compiled directly. The \$Segment metacommand lets you mark 64K-byte (or less) sections of the source program, and a special spooling technique is used to continuousgrams. The .EXE programs crely compile to disk.



down menus. Even multiple configuration setups are possible.

ated by QuickBASIC require a separate library file to be loaded at run time

Another benefit is the way large programs are accommo-

language. Some of my favorites are &B and Bin\$ for binary dated. Since no separate link numbers and MTimer for timing events to a resolution of 2 miconseconde Network support is not built

into Turbo Basic; however, the language does let you access the processor's registers and then

More than two dozen addi-

tional commands and features

have been added to the BASIC

FACT

Turbo Basic Borland International Inc. 4585 Scotts Valley Dr. Scotts Valley, CA 95066 (408) 438-8400 List Price: \$99 Regulres: 256K RAM. DOS 2 O or later In Short: An outstanding

compiler that works quickly and compiles fast-executing code. Not copy protected. CIRCLE 487 ON READER SERVICE CARE

call any of the DOS or BIOS interrupts. Thus, it is possible to lock and unlock file records, though not without some difficulty.

There are other shortcomings as well. Unlike QuickBASIC the compiler will catch only one error at a time, and the program trace mode is not as nice as OuickBASIC's, But my biggest objection is the way the editor leaves .BAK files all over the place. In any program, automatic backups should be an option-period.

All in all, though, Turbo Basic is an outstanding compiler, and I wouldn't be surprised to see many frustrated C and Pascal users switching to it.

BASIC Moves into Adulthood

At the age of 23, BASIC may be ready to shed its sophomoric image and start walking tall as a serious programming language. BASIC took a giant step

into the starring role of the programming world when IBM, in essence, gave away a simple adaptation of it by burning it into the ROM of the original PC.

It quickly became the PC power user's favorite toy. great for trying out program ideas without messing with flowcharts or defining every last variable before starting.

BASIC may be tolerant, but it isn't fast. And, because it demands no discipline, it can be a nightmare to debug.

Many people who learned BASIC programming on a PC moved on to Borland's Turbo Pascal, which is fast, encourages good programming practices, and provides ample debugging help. Microsoft countered with QuickBASIC 2.0, a speedier

compiler that gives plenty of Now BASIC's creators John Kemeny and Thomas

Kurtz, have been working on their own improvements. TrueBASIC 2.0 adds speed and trace debugging (a review will appear in First Looks in our next issue).

Borland seems to have built the necessary speed and features into Turbo Basic to keep BASIC programmers from moving on to a new language. The question is, are these new arrivals too late? Or should we wait for

Turbo C?

-Gus Venditto

EasyTax

(continued from page 33) or number. The Available

Forms menu stays on display on two lines near the top of the screen. On the first pass at the 1040, it can be puzzling to see the "protected cell" message warning you that you can't fill in a particular blank. Then you realize that this is the program's way of making you do the supporting schedule first, so that it has a chance to get the details and do any necessary subsidiary calculations for you.

A reassuring feature of Easy-Tax is the odometer that rides at the top of the screen. It shows you your tax liability and the amount you owe or your refund as you go along. When you

want to see the bottom-line effect of any new entry, press F9 to update the calculations and see your new key figures. I tried out EasyTax on my col-

league, a computer maven who's used 1-2-3 for doing his tax returns for the past couple of years. He came back saying the program was fine, "but if I use this, I would miss all the fun of working out my own formulas." If you have a different idea of fun, EasyTax may be just the program that gets you through your tax return in time to salvage part of your weekend.

Actually, I thought it was fun to see the formulas in the upperleft-hand corner, just as they appear in any 1-2-3 spreadsheet. You might even learn a little more about how to write your

The Tax Advantage: Seasonal Relief



BY CATHERINE D. MILLER The Tax Advantage is for everyone who'd like to put distance between themselves and Uncle Sam's Form 1040, while simplifying the filing process.

In its fifth year. The Tax Advantage, Version 186.0. offers fewer forms than EasyTax or TarboTax (see First Looks, page 33, PC Magazine, Volume 6 Number 4, for our review). It supports five Federal tax forms (1040, 2106, 2441, 4562, and 6251) and eight schedules (A, B, C, D, E, G, SE, and W), But The Tax Advantage shields you from the overwhelming complexity and clutter of the government.

ernment's forms.
Each form or schedule is displayed as a simplified version of the actual IRS form. Because on-line help is minimal, you'll need to refer to the IRS instruction booklet for guidance. The Tax Advantage's quick demonstration program can get you through the nonintuitive command structure painlessly.

If you feel comfortable with Form 1040's structure, you may be put off by the way the program prefaces every entry with E for Enter, A for Add, I for Itemize; you can't just type in a number on a line. But this structure works well in keeping tabs on your entries.

You can itemize any line on any form—beyond what the IRS requires. This is helpful if you want to keep track of different sources of income, for example. Lines on Form 1040 requiring itemization by the IRS are dynamically linked with the proper forms and schedules, which the program will remember to print when you're done

(or think you are).

The Tax Advantage continually recalculates your tax liability as you enter new items;

you can display your tax and tax bracket at any time. By pressing O to invoke the Options command, you can find out what your tax will be if you change a fine of any form or schedule.

If you want to compare taxes when several items are changed, the Tax Planning feature will calculate you new tax liability. However, you cannot display the results of two different tax scenarios at the same time. And, because the new tax laws for 1987 aren't taken into consideration, this feature isn't reliable for tax-planning pur-

FACT FILE

The Tax Advantage, Version 186.0 Double Eagle Software Inc. 2210 Wilshire Blvd., #875

Santa Monica, CA 90403 (213) 459-9748 List Price: \$59.95; update for 1985 version, \$35.95. Requires: t28K RAM, DOS 2.0 or fater

In Short: Simplifies preparation of Form 1040 and the most commonly used schedules for 1986. It includes what-if calculations but is not helpful for 1987 planning since it doesn't lake the new tax laws into consideration. Not cony morected.

Although it doesn't offer a multitude of forms, The Tax Adwantage is a great help to those who are filing a simple tax return and don't want to do the calculations on their own.

It can also take some of the drudgery away from tax filing by sparing you from the IRS's intimidating language. The Tax Advantage's sparse structure is a far more appealing way to face the April 15th deadline than dealing with Form 1040 all by yourself.



The Tax Advantage's uncluttered menu structure helps keep confusion to a minumum; a tax overview (bottom of the screen) can be called at any time.

formulas if you pay close attention.

EasyTax does not have state tax-return modules this year, so you can satisfy any cravings you may have for spreadsheet formula-writing when you complete the state return.

Help With W-4 Form In response to requests, the company added help in dealing with the IRS's latest curse on the taxpaying public: the fourpage W-4 form. EasyTax helps in figuring out the proper allowances to claim and will give you an estimate of the income the IRS will withhold; a number the responsable forces? I sensible.

government doesn't provide.

EasyTax may be published
by a small company, but it
maintains a very healthy ap-

proach to customer support.

Last year's registered users can
upgrade for \$2.5; this year's us1987 tax year filing) for \$30. 100



The 1-2-3 formulas are right where they always are, in the upper-left-hand corner. You won't have to touch them, unless you use EusyTux for a state tax return.

FACT

EasyTax
Valley Management
Consultants
Jay Brander Rd.
Huntingdon Valley, PA 10006
List Price SSP, updates cov
List Price SSP, updates cov
List Price SSP, updates cov
Easy Tax Cov
England SSP, C

CIRCLE 426 ON READER SERVICE CARD

Celebrity Packs Lots of Value Into \$90 Word Processor

HANDS ON

Superb integrated features and

choice of interfaces put Celebrity

at the top of its class.

BY MITT IONES

Celebrity, Good Software Corp.'s new word processor, first piques your curiosity with a list price of about \$90. Then it reels you about and nails you to the wall with a list of features few other word processors can

You get most of the power features you'd expect from a \$300 word processor-including an on-line tutorial, an 80,000-word spelling checker, a thesaurus, macros, windows, and mail-merge-but the features don't stop there. You also get a first-class in-

tegrated calculator and an equally impressive calendar. Then there is the Forms feature. which is essentially a ready-

Unexpected Features Add Power

made, general-purpose database with mail-merge capability. Add to that a three-proneed command interface that allows you to invoke each command via 1-2-3-like menus, a command line, or function keys, and

word within a group of words already in bold display, though the text printed as it should

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agronmy of the area will garve as it has the rest of our happy well fed and triamed tree in a he Technology likes to keep trees he The cost of our proposal la-

une cost of our proposal is-quantity of service you require. -way, you can quickly determine u-you decide to apprade the number-property. Similarly, you will a-

In addition. Celebrity simply lacks the sophistication of top-

rectly display an underlined

CELEBRITY SPELLER SYSTEM

Options Available:

Celebray's interactive spelling checker suggests olternate spellings and even flags

you've got what would seem to be the perfect word processor for personal use. But, while many of Celebrity's features are so powerful and well implemented that you'll be shouting with delight, the program is not without its faults and limitations

sentences that don't begin with a capital letter.

The program could not cor-

of-the-line professional word processors in some areasthough they are few. For example. Celebrity does not support print spooling, does not offer automatic outlining and footnoting, canno. , serve case during search and replace operations, and has limited header and footer capabilities. These limitations, though not at all unusual in personal and professional word processors, restrict Celebrity's usefulness in a cor-

To a Low-Cost Word Processor porate environment. screen, and the message line

Celebrity's integrated calculator, calendar, and database-like facility make the package a good choice for those who need only intermediate word-processing power and want one piece of software on their PCs all day-or perhaps a good choice for a home work-ex-

tending machine The calculator boasts business, scientific, and programming functions, as well as memory storage. The current document remains visible on the left side of the displays a running account of your equations. The calculator also lets you upload figures into the document. The calendar is easy to use and look at. You can print daily, weekly, or monthly schedules and print yearly calendars, as well.

The database-like Forms feature is ideal for keeping track of phone numbers and addresses and lets you print lists or perform mail-mergetype operations.

-Mitt Jones

Three Ways to Format Celebrity occupies the bot-

like commands.

tom three lines of the display screen with three information lines-the status line, command line, and message line. The status line displays information such as the current document and the position of the cursor. Ctrl-Alt moves you to the command line, where you can enter any one of about 100 English-

Alternatively, you can issue commands through a point-andshoot menu. You hit the PrtSc key to display the primary menu

on the command line. The mes sage line, directly below the command line, displays the menu options that you can access through the highlighted command line option.

When not being used for menu display, the message line gives you helpful tips and reminders

Celebrity's third user interface puts your PC's Ctrl. Alt. and function keys to good use. You can issue most commands. including a wealth of block commands, with one keystroke combination, though a keyboard template is conspicuously

missing

Celebrity's formatting scheme utilizes formatting lines within the document, instead of hidden control codes, to keep track of format changes. Horizontal rulers display the current horizontal margin and tab settings, and vertical rulers display vertical margin and spacing information. You can modify formats by creating, editing, copying, moving, or deleting both types of rulers

All in all, Celebrity is a powerful, flexible program that is likely to make waves in the future. Though Version 1.0 lacks the sophistication it needs in some areas to qualify as a topnotch professional word processor, Celebrity has the potential to blow most personal word processors-and a good share of professional word processors-off the shelves



Good Software Corp. 5429 LBJ Freeway, #720 Dallas, TX 75240 (214) 239-6085

List Price: \$89.95 Requires: 256K RAM, DOS 2.0 or later. In Short: What Celebrity lacks

in sophistication, it makes up for with sparkling integrated features and a choice of command schemes. Not copy

protected CIRCLE 446 ON READER SERVICE CARE

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of data.

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Hotline: Phone as a Power Tool



HANDS ON

BY JONATHAN MATZKIN This Hotline won't connect you to the Kremlin, but it can do some amazing things with your modem and telephone.

General Information packed its \$39.95 memory-resident program with four phone directories, an auto-dialer, and a call log and then wrapped the package in an inviting, simple-to-

learn user interface. Hotline's 2.000-entry national phone directory lists airlines, hotels, car-rental agencies, large corporations, and other utile numbers. Almost all major microcomputer suppliers are included. You can pointand-shoot your number or have the program search and then

Hotline's cities directory posts the local time and area code for more than 3,000 cities. A "hot key" pops up Hotline's main menu bar, which sits on top of seven logically organized pull-down menus. Altkey combinations execute many major functions and are easily customized, so possible keycombination conflicts can be avoided (but the program won't run under TopView or Microsoft

Windows) A private directory is com-

piled from a text file and, unfor-

tunately, must be recompiled whenever listings are added. An area-code directory returns the location and local time

a specified state.

for an entered area code. It also displays a list of all area codes in

A log function will store the telephone number and city called, as well as the times and



General Information Inc. 401 Park Pt., #305 Kirkland, WA 98033 (206) 828-4777 List Price: \$39.95

Requires: 256K RAM, Have compatible modern, DOS 2.0 or

In Short: Slickly executed software that will make you wonder how you ever used a telephone without it. Not copy protected. CIRCLE 445 ON READER SERVICE CAR

dates of each of your phone calls. Hotline's beautifully realized combination of functions. and its low price, make it an outstanding product. And the next time your printer screws up, being able to dial customer support in a matter of moments could save enough time and hassle to recoup your Hotline investment

Dialer Simples Lee Leun Outiese Soles Sain Ernst 8 Whinesy Essette Fundafies Corp Ethyl Corp Esreptor - Barr Find: type case, proce 4-1 Binl: proce 4-1 Frees ESC to cascal ? or i to select PyDe or PyDy for more Frees FID to milit number

Hotlipe's national directors can dial any of 2,000 corporate phone numbers; you can scroll through or make a request

Dac-Easy Base Lives Up to Its Name. Sets New Low-Cost DBMS Standard



HANDS ON

BY JOE BENDERAVAGE Here is a program that small businesses, unfamiliar with sophisticated database languages. will find useful for phone number lists, mailers, and supplier lists. More-sophisticated users will appreciate its integrity with other data file formats (including dBASE II. ASCII, SDF, or ASCII delimited files).

Everyone will be pleasantly shocked by its \$49.95 price. Dac-Easy Base is similar to dBASE II in appearance, yet it improves upon it in ease of use. system limits, on-line and contextual help, numeric accuracy to 15 digits, security by password, storage of more and larger memory variables, and onscreen report layouts. The program can interface with dBASE II files and emulate its

dot prompt, though Dac-Easy's menus are the better matrix. Dac-Easy doesn't support a good number of dBASE II's less commonly used-but nonethe-

less powerful-features, including the Call, Copy Structure Extended. Create from Extended, and Modify com-

Unlike dBASE II, only one command is needed to change the structure of existing databases already containing records. You can assign three working areas, determine the relationships among records and files, do operations on subsets of records or fields, and join sorted or indexed files to produce a new table. Join and Append operations can be done through the Whole menu.

Files are displayed in rows and columns, and the displays can be customized. Each screen has a handy explanation line at

the bottom that changes whenever the cursor position shifts. Much mileage is derived from these few screens, prosaically used with the majority of com-

A serious irregularity occurs within the Scope screen: two of its four choices (the Next and Record N options) work so poorly that when either choice is entered, the system is brought to a fatal halt. You'll lose any data entered but not already saved to disk when this happens. Because the Scope screen module is invoked for the Display, Locate, Delete, Count, and Copy commands, as well as five others, you need to use the Scope screen module often, but you

ought to avoid the Next and Record N options completely. Screens should be more definitive, with the results of a previous screen carried to the next. And several inconsisten-



Dac-Easy Base Dac Software Inc 4801 Spring Valley Rd., Bldg.

110B Dallas, TX 75244 (214) 458-0038 List Price: \$49.95

Requires: 256K RAM, DOS 2.0 or later In Short: Offers a surprising number of features for an amaz-

ing price, but this initial version has a few bugs. Not copy pro-CIRCLE 444 ON READER SERVICE CARD

cies between the manual and the

program must be corrected. Generally, Dac-Easy's command language is more English-

like than dBASE II. In fact, the entire package is eminently user friendly Dac-Lasy base is very well suited to people who want an easy-to-use file manager.

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CIRCLE 478 ON READER SERVICE CARD

R.S.V.P. your local authorized dealer.

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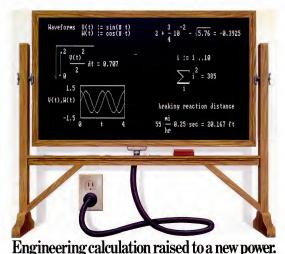
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to signal processing and thermodynamics to fluid mechanics. Call us today.

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CIRCLE 154 ON READER SERVICE CARD

Sharp Packs the Elements of Success into Portable PC-7100



Sharp Electronics Corp. may be better known for its leadership role in the blanketing of the American outdoors with boom boxes than with being on the cutting edge of personal computer technology. Enhancements to Sharp's portable line,

however. give the company every hope of bolstering its reputation as an innovative reliable PC maker.



a very attractive buy at \$2,795. In many ways, it's an ideal home computer.

Virtually every inch of the PC-7100's squat box is packed. At 16.1 inches wide, 8.5 inches high, and 6.3 inches deep, there's little room to spare-just enough to add an internal

300/1,200-bit-per-second Hayes-compatible modem, an 8087 coprocessor, and extra



the features in the Sharp PC-7100 are new, but the combination of a 20-megabyte hard disk. a 51/4-inch floppy disk drive, and a backlit supertwist, supersharp blue LCD display in a RAM up to 704K bytes (in 128K-byte increments). The 84-key detachable keyboard has a separate numeric pad and is large enough even for my chubby hands.

8.07

clock keeps time, DOS can't read it. Sharp didn't add the necessary interface to its version of MS-DOS 3.1. The time and date are accessed by hitting

the ROM-based Setun menu. Processing speed is not at the level of the Compaq Portable II (which will run you about \$2,000 more), but the Sharp's 80C86-2 processor, ticking away at 7.37 MHz (it can be slowed down to 4.77 MHz) and sharing the load with a fairly zippy hard disk (rated by Sharp at 49 milliseconds, clocked by PC Labs benchmark tests at 57.7 milliseconds), turned in a good performance. It even passed muster on Microsoft Windows-no mean feat for a

The supertwist screen is easy on the eyes, even on CGA graphics; it is the same technology that is used in Zenith's Z-181 laptop. The Sharp screen measures in on subjective, sideby-side eyeballing as just one notch less bright and less sharp than the Z-181

The Setup menu allows a choice of a monochrome display adapter or CGA display. A wide-screen size results in an aspect ratio of 2.3 (versus 1.3



Sharp PC-7100 Sharp Electronics Corp. Sharp Plaza Mahwah, NJ 07430

(201) 529-8200 List Price: Including one floppy disk drive, a 20-Mbyte hard disk, and 320K RAM, \$2,795; internal modern, \$349; adapter for external RGB monitor.

\$255; printer, \$399. In Short: A well-made dualspeed portable. At 20.6 pounds, it's a little heavy for regular travel, but its crisp display makes it a pleasure to use. CIRCLE 425 ON READER SERVICE CARD

because the dot meshing is so good I'd take the Sharp's electric-blue display over a full-size CGA monitor for extended

All this makes the PC-7100 nearly ideal for home use excent for one (maybe not so) minor detail. It may not run your favorite games; Night Ranger wouldn't boot.

It runs only on AC power, so it won't keep you busy on the morning train ride but, in all other respects, the PC-7100 mixes the right elements of portability and desktop power.

20.6-pound package makes this Oddly, though the internal on a 13-inch CGA display), but Benchmark Tests: Sharp PC-7100 vs. Compaq Portable II which equals an 8-MHz IBM PC AT in p Sharp PC-7100

4 18

Compaq Portable II

81.06

■ NEW ON THE MARKET ■ JONATHAN MATZKIN

Add-on 31/2-Inch Drive Works with Variety of PCs and DOS Versions

Manzana Microsystems has introduced an external 31/2-inch microfloppy disk drive that interfaces with a broad range of compatibles and DOS 2.0 or later. The compact unit is avail-

able in two versions. The \$355 MDOA connects to the external disk drive port on the IBM floppy disk controller card, much like other external microfloppy disk drives already available. The unit gets its power through the 37-pin port, eliminating the need for an addition-

al power cord. The \$395 MDOX comes with an expansion-slot interface card that allows use of the disk drive with computers that lack an external disk drive port. The interface card also supplies power to the unit.

Manzana sells both the MDOA and MDOX disk drives with device drivers and a format program that allows microfloppy disks to be formatted for a full 720K bytes with DOS 2.0 or later. Other external microfloppy disk drives on the market require DOS 3.2

List Price: MDOA, \$355; MDQX, \$395. Requires: MDOA: disk drive controller card with external disk drive port, DOS 2.0 or later. MDQX: DOS 2.0 or later. Manzana

Microsystems Inc. 7334 Hollister Ave., Suite B, Goleta, CA 93117; (805) 968-1387.

CIRCLE 440 ON READER SERVICE CARD

Memory Expansion From IBM Supports 6 Mbytes on One Card

IBM Corp. has introduced a Memory Expansion Adapter for its 80286-based machines, including the 3270 AT. The board costs \$749 with 512K bytes of RAM, and additional 1-megabyte memory modules are \$349. Because the memory modules are densely packed, IBM says, a full 6 megabytes of memory can be installed on the expansion adapter without the use of "piggyback," or add-on, adapters.

Up to 6 megabites of RAM can be packed onto (\$749 with 512K RAM) for IBM costs \$349 in jacce. ments of I megabyte



List Price: Memory Expansion Adapter with 512K RAM, \$749; additional 1-Mbyte modules, \$349. IBM Corp., 1000 NW 51st St.,

Boca Raton, FL 33432; (800) 447-4700

CIRCLE 441 ON READER SERVICE CARD

a full- or half-height hard

one 360K-byte disk drive and

512K bytes of RAM on the

motherboard (which is ex-

pandable to 640K). The PC10-

2 has 640K on the mother-

board and a second 360K disk

drive. Commodore bundles

MS-DOS and GW-BASIC

List Price: Commodore PC10-

1. \$999. with \$12K RAM. one

360K disk drive, ATI Graphic

al and parallel ports. PC10-2,

\$1,199 with 640K RAM and

two 360K disk drives. Comm

dore Business Machines Inc.,

1200 Wilson Dr., West Ches-

ter, PA 19380; (215) 431-9100.

CIRCLE 400 ON READER SERVICE CARD

Solutions display card, and seri-

with both computers.

The PCIO-I comes with

Commodore Launches PC-Compatible Effort with Two Inexpensive Models room inside both chassis for

Add Commodore Business Machines to that ever-growing list of vendors vying for a hunk of the DOS computer pie. Best known for its home-market efforts and for the splashy Amiga, Commodore now offers two MS-DOS computers, the \$999 PC10-1 and the \$1,199 PCIO₂

Both systems are built around the Intel 8088 processor running at 4.77 MHz. Standard equipment includes the ATI Graphics Solutions display adapter card, which supports CGA, monochrome display adapter, Hercules, and Planatronics video modes. Also standard are RS-232 serial and Centronics parallel ports and five full-length expansion slots. The systems share a

PC-XT-compatible BIOS and an XTstyle keyboard with ten function keys and

a numeric keypad. Commodore left Commodore's PC10-2 features two 360K-byte disk drives and 640K RAM on the motherboard. The \$1.100 machine has a CGAand Hercules-

equipment.



Smooth Talk: A Surge Protector for Modems. Phones, Fax Machines

The Diamond Chip, a \$19.95 phone-line surge protector from Curtis Manufacturing Co., safeguards telecommunications equipment. It also protects data during transmission through un-

protected phone lines. The device plugs directly into an AC wall outlet and accommodates two modular phone cables to close one complete circuit. A 360-degree swivel mount eases installation with equipment such as facsimile machines, telex machines, and modems



Curtis Manufacturing's Diamond Chip is a \$19.95 phone-line surge suppressor that safeguards phones, modems, fax machines and other telecommunicati conjument.

List Price: Diamond Chip, \$19.95, with 6-foot patchcord. Curtis Manufacturing Co. Inc., 305 Union St., Peterborough, NH 03458; (603) 924-3823

CIRCLE 443 ON READER SERVICE CARD

Third-Party Developers Debut Applications for Lotus PC Environment

Lotus Developer Tools has touched off a small avalanche of add-in applications for Lotus Development Corp.'s 1-2-3 and Symphony, fostering the rise of Lotus's architecture as a major PC operating environ-

The \$150 Developer Tools allows independent software developers to attach add-ins directly to the 1-2-3 and Symphony drivers. Add-ins created with the tools run underneath 1-2-3 \$995 fac-

mile board

and been

Panasonic Add-on Fax Board Runs in Background, Costs Less Than \$1,000



In the inexorable march of office-machine evolution, highend facsimile machines may soon go the way of the dinosaur. Their functions are being usurped by that marvelously adaptive creature, the PC. Panasonic Industrial Co.'s \$995 FX-BM88 is the latest PC board that provides full fax functionality without dedicating its host system.

The full-length add-in card automatically receives documents or transmits them to multiple locations, even if you are running an unrelated application.

You can view and edit documents on-screen, using Panasonic's version of Paintbrush. which is bundled with the FX-BM88. The board's menu-driven software records and displays all facsimile activities. In addition, you can create a telephone directory.

List Price: Panasonic FX-BM88, \$995. Requires: 256K RAM. Panasonic Industrial Co., One

Panasonic Way, Secaucus, NJ 07094; (201) 348-7000.

CIRCLE 430 ON READER SERVICE CARD

or Symphony and share Lotus's interface and menu structures.

Turner Hall Publishing's 4Word (see First Looks, page 44, Volume 6 Number 4) is a full-featured word processor, as is Write-In from Blossom Software Corp. Blossom's \$99.95 program has a full range of standard word-processing features. plus keystroke macros and mailmerge. Write-In supports the Lotus/Intel/Microsoft expanded memory specification. InWord. a \$99.95 full-function word processor, is from Funk Soft-

ware. Amazon Systems takes a different approach for its \$49.95 add-in word processor. Pluswords. The program provides basic, functional word processing, without bells and whistles. Amazon emphasizes ease of use as a selling point.

Datasheet, a \$149.95 relational database add-in, expands the database power of 1-2-3, according to Informix Software. The program stores data in a true database, rather than in a spreadsheet, but you can view data through the familiar 1-2-3 interface. You can build sonhisticated database applications that have data entry forms and complex reports.

SeeMore, from Personles Corp., displays 1-2-3 worksheets in new, revealing formats. The \$99.95 program can shrink on-screen characters so that up to five times the usual number of cells can be seen at

one time. Goal Solutions, \$79.95 from Enfin Software Corp., allows 1-2-3 to specify-and solve for-goals. Goal Solutions eliminates trial-and-error whatif guessing by calculating the

desired value automatically. A \$50 financial projection add-in, Kelpro, is available from KEL Systems. The program calculates terminal rate of return, financial management rate of return, internal rate of return, and net present value. A report-generating function shows the present value of each

cash flow line. List Price: Lotus Developer Tools, \$150. Requires: Symphony or

1-2-3, Release 2.0 or 2.01; 8086-8088 macro assembler; 8086-8088 linker: DOS 2.0 or later. Not copy protected. Lotus Development Corp., 55 Cambridge Pkwy... Cambridge, MA 02142; (800) 345-

Financial Analysis and Reporting Package Is Almed at Fortune 1000

Fastar \$25,000 from Corporate Class Software, is not for mom-and-pop businesses. But for large corporations, the package provides a powerful, complete system for financial reporting and analysis.

Among some of its more important functions, Fastar collects, organizes, and manages financial schedules for multiple divisions or departments, accounting periods, and actual

budget or forecast categories. Data can be loaded from popular micro-based packages such as 1-2-3 and dBASE.

List Price: Fastar, \$25,000 for a departmental system that supports up to 25 users; trial implementation with real data, \$5,000; data collection and setup services, \$15,000. Requires: 640K RAM.

hard disk, DOS 3.1 or later. Not copy protected. Corporate Class Software Inc., 1211 Ave. of the Americas, 23rd Floor, New York, NY 10036; (212) 719-8209.

CIRCLE 442 ON READER SERVICE CARE



Fastat makes heavy use of windows in its easy-to-follow user interface. The \$25,000 financial analysis and reporting package is intended for large corporations

1043, (617) 577-8500.

CIRCLE 432 ON READER SERVICE CARD List Price: Write-In. \$99.95. Requires: 60K RAM; 1-2-3, Release 2.0 or 2.01. Not copy protected. Blossom Software Corp., One Kendall Sq., #220, Cambridge, MA 02139; (617) 577-

8879. CIRCLE 433 ON READER SERVICE CARD List Price: InWord, \$99.95.

Regulres: 70K RAM; 1-2-3. Release 2.0 or 2.01. Not copy protected. Funk Software Inc., 222 Third St., Cambridge, MA 02142; (617) 497-6339. CIRCLE 434 ON READER SERVICE CARD

List Price: PlusWords, \$49.95. Requires: 1-2-3, Release 2.0 or 2.01. Not copy protected. Amazon Systems Inc., 28 Atlantic Ave... Beverly, MA 01915; (617) 927-8496.

CIRCLE 435 ON READER SERVICE CARD List Price: Datasheet, \$149.95. Requires: 640K RAM; 1-2-3,

Release 2.0 or 2.01; hard disk. Not copy protected. Informix Software Inc., 4100 Bohannon Dr., Menlo Park. CA 94125; (415) 322-4100.

CIRCLE 436 ON READER SERVICE CARO List Price: SeeMore, \$99.95.

Regulres: 1-2-3, Release 2.0 or 2.01:EGA, CGA, or Herculescompatible adapter. Not conv protected. Personics Corp., 2352 Main St., Bldg. 2, Concord, MA 01742; (617) 897-1575.

CIRCLE 437 ON READER SERVICE CARD List Price: Goal Solutions, \$79.95. Requires: 64K RAM; 1-2-3, Release 2.0 or 2.01. Not copy protected. Enfin Software Corp., 6920 Miramar Rd., #106A, San Diego, CA 92121; (800) 922-4372. CIRCLE 438 ON READER SERVICE CARD List Price: Kelpro, \$50. Requires: 1-2-3, Release 2.0 or 2.01. Not copy protected. KEL Systems Inc.,

8 Taft Ave., Bethpage, NY 11714; (718) 229-5981. CIRCLE 439 ON READER SERVICE CARD

Clipper Adds Support for EMS. DOS 3.1—Compatible Networks



BY GLENN HART

The dBASE compiler and clone market continues to become even more competitive. Hot on the heels of FoxBASE Plus and Ouicksilver, market leader Nantucket has released its latest ver-

sion of Clinner The Autumn '86 release is an evolutionary upgrade, not a new product. There are about two dozen new or enhanced commands and functions, several of which look useful but none of which are particularly earthshaking. Clipper can now access Lotus/Intel/Microsoft expanded memory for buffers, which should speed certain operations. Clipper still uses its own index files (boo!), but Nantucket has finally removed copy protection (hooray!).

The big news for serious ap-

plications developers is the addition of multiuser, networking support. Clipper applications can now run on networks that support DOS 3.1 calling conventions. Compiled applications don't require any run-time modules, and there aren't any licensing fees or royalties, no matter how many network

nodes use the programs. This is

(Times given in minutes and seconds)

Clipper, Autumn '86 release

Clipper, Winter '85 release

FOYRAGE Plus

Quicksliver

dBASE III Plus

a far better scheme than Ashton-Tate's costly and cumbersome network access system. The networking commands themselves support record and file locking and are similar to those in dBASE III Plus.

The new Clipper clocked in at speeds 7 to 16 percent faster than the previous version. Improved memory-management dBASE-Compatible Compiler Speed Test

Report 2

1:28

1:56

Report 1

0:46

Timing the same two reports that were generated whiter, and both Plus and compiled under FoxBASE Plus, Outcksilver, and both iming the same two reports that were generated under dBASE III

ases of Clipper shows that FoxBASE Plus is still the fastest.

course-competibility with dBASE applications and ease of use are

Speed is not the only consideration for selecting a compiler, of

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IPC.	F	Α	C	1
MARKET	F	ı	I.	E

Clipper, Autumn '86 releas

Nantucket Inc 5995 Sepulveda Blvd. Culver City, CA 90230

(213) 390-7923 List Price: \$695; upgrade for registered owners, \$139. In Short: An incremental up grade of one of the most popular

dBASE compilers. Not copy protected. CIPCLE 447 ON READER SERVICE CARD

techniques (even without expanded memory, which is how we tested them) and a better indexing algorithm are responsible for the speed improvements. Don't be surprised to see faster sorting in the next release.

The Autumn '86 Clipper is a definite improvement over prior versions on several scores. If you have been waiting for a networking, multiuser version of Clipper, your ship has just come in!

just as importent. MatchPoint-PC Reads. Writes. **To CP/M and Apple II Disks**



HANDS ON BY HOWARD MARKS

The largest computer-related investment any of us have isn't hardware or software but data. This investment of time and knowledge has stopped many people from converting from their present computer to a new system that is better suited to

their needs Micro Solutions has solutions for anyone using Apple II or CP/M microcomputers Their earlier program, Uni-Form-PC, is a device driver that allows your PC to read and write

over 100 different CP/M disk formats, including all the morepopular soft-sectored formats (such as the Altos Series 5; DEC Rainbow; Epson QX-10; HP-125; Kaypro II, 4, and 10; Osborne 1; TRS-80; and Wang-

With UniForm-PC running, your PC reads and writes CP/M disks just like they were DOS disks. (See "Beating the DOS-CP/M Compatibility Blues," PC Mogozine, Volume 4 Number 7, for a detailed review of UniForm-PC.)

CP/M Emulator

Now, Micro Solutions can rescue the CP/M programs that you weren't ready to consign to the ash heap of history. UniDOS is a CP/M emulator that will run most CP/M software (including Z-80 code) in an ordinary 51/4inch PC disk drive. (The company sells a \$195 half-card with a Z-80 for faster execution, but my tests found the program to

files can be salvaged with MatchPoint-PC, a card that installs between your floppy controller and drives. MatchPoint-PC includes UniForm-PC and lets you read or write data files from Apple II or IIe disks formatted under AppleDOS, Pro-

DOS, SOS, or Apple CP/M. All three products lived up to their advance billing. I was even able to use all three at once by running the CP/M version of WordStor on an Apple CP/M disk. These products are the easiest way to exchange data between Apple IIs, CP/M machines, and PCs. They are strongly recommended if you are upgrading from one of these older systems, have to send or receive data from someone with these machines, or work in an organization that uses PCs and

₽ F A C T FILE

MatchPoint-PC Micro Solutions Inc. 125 S. Fourth St. DeKalb, IL 60115 (815) 756-3411 List Price: \$195, includes a copy of UniForm-PC. Regulres: 128K RAM, two disk drives, DOS 2.0 or later. In Short: A board that reads and writes to Apple II and CP/M disks in a PC disk drive

CIRCLE 422 ON READER SERVICE CARD

UniDOS Micro Solutions Inc. 125 S. Fourth St. DeKalb, IL 60115 (815) 756-3411 List Price: \$69.95 Requires: 192K RAM, DOS

2.0 or later In Short: A CP/M emulator that runs CP/M programs written for the Z-80 or 8080. DROLE 422 ON READER SERVICE CAR



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"Anyone who needs quick, in-house production of flyers, banners, handouts, and newsletter-type documents will enjoy Fontasy."—Robin Raskin, PC Magazine, May 13, 1986 ", excellent desktop publishing

program."— Jerry Pournelle, BYTE, September, 1986.



Equipment Needed

SM PC, XX AT or true compatible (Compage, act) said 180 for Nevenia graphics adapter and gapshics motions 180 for Nevenia graphics adapter and gapshics motion 2506 memory needed for partial agaps, 522 6606 seconstanded for fail pages or most prisons. ICROMS suggest 1806 Capplage Parter Popertrate, Epson PX, XX LX, MX, RX, etc. I, CL, Clab Soli, 1505, 1520, Popertrate III PZ 202 in along a Tigal. Trainbale Mession 52 202 in along a till Seconspatible Game 160; 150 Radio Shaka 1509 120 650, 2020. Both Line Mark Solid S

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CIRCLE 300 ON READER SERVICE CARD

■ QUICK LOOKS

Chessmaster: Challenge the Champ

PC

HANDS ON BY MITT IONES

The Chessmaster 2000 from The Software Toolworks will dazzle you with its animation, impress you with its features, and beat you at chess, provided you don't get frustrated and demagnetize it first.

Chessmaster, which won the 1986 U.S. Open Computer Chess Championship in the PC class, offers 12 levels of play. Level 1 allows your wily opponent only 5 minutes to make 60 moves, and at that rate you should fare well.

But Chessmaster gets tough by level 6, which allows it 120 minutes to make 40 moves. You may never have the nerve to try level 12 (1 move per 6,000 minutes)

The Chessmuster 2000 gives you the option of a 2-D ar 3-D display. You can play with the master or a friend: if you want, Chessmuster will referee the game.

You specify your move with the cursor keys or by entering the appropriate algebraic notation.

Chessmaster's board and pieces are both acceptable on a text display, but the fun starts with monochrome graphics. which allows you to display the board in a crystal-clear 2-D image. A somewhat-less-sharp 3-D display is optional with color

Chessmaster is also packed with features that can help you improve your game. You can replay 100 classic chess games from the disk. You can also ask the game for hints or prompt it to analyze your moves.

If you like chess. buy Chess-

master. You are unlikely to find a more patient and skillful partner anywhere. List Price: The Chessmaster 2000,

List Price: The Chessmaster 2000. \$39.95; backup disk, \$5; hard disk installation option, \$10 with proof of purchase.

of purchase.

Requires: 256K RAM, one disk
drive, DOS 2.0 or later. Copy
protected. The Software

Toolworks, One Toolworks Plaza, 13557 Ventura Blvd., Sherman Oaks, CA 91423; (818) 907-6789.

CIRCLE 448 ON READER SERVICE CAR

Forms On-File: Over 100 Templates

PC

HANDS ON

BY MITTJONES

Brush your straight edge and pencil aside: Channelmark Corp.'s Forms On-File puts 100 ready-to-print business forms at your fingertips and makes designing new forms a breeze.

Ready-to-print forms are grouped by purpose in libraries, ranging from Accounting to Shipping-and-Receiving. After you activate a form, the

program returns to the main menu, where options allow you to edit and print the form. The printed forms are crisp and attractive, and an optional

company heading, which you specify once as the default, adds a professional touch to company forms. Forms On-File supplies

nearly 200 form templates that you can edit to suit your needs. You edit templates in the same way you edit ready-to-print forms.

An intuitive user interface

makes it easy as copy, delete, or

edit new form libraries.

Forms On-File supports only dot matrix printers, and you can't view or edit forms as they will appear when printed.

Still, Forms On-File packs most of the forms you could ever need into a \$59.95 pack-

age, and the program's simple structure and context-sensitive help are a real plus. List Price: Forms On-File, \$59.95; backup disk. \$5. Resultes: 256K RAM. Copy

Supports: IBM Graphics Printer or

Proprinter: Epson FX, JX, MX (with Graftrax), RX, LQ-1500: Okidana 84, 92, 93, 182, 192, 193, 292; C. Itoh Prowriter; IDS 460, 560, Prism: NEC 8023; Toshiba P351: Dataproducts 8050. Channelmark Corp., Power Up!, 2929 Campus Dr., San Mateo, CA

94403; (800) 851-2917.

CIRCLE 449 ON READER SERVICE CARD.

Learning DOS: A Lively Tutorial

protected

HANDS ON

BY CATHERINE D. MILLER

From starting DOS to setting up a CONFIG.SYS file, Microsoft Corp.'s Learning DOS teaches DOS concepts and commands with a style that's friendly enough to put even the most frightened novice at ease. You—or your computer-

phobic friend—can move through the lessons at your own pace; Ctrl-key combinations allow you to skip around within a lesson. If you already have more computer experience, the program's self-less will direct you to the lessons covering topics that are new to you. Learning DOS includes les-

sons for hard disk systems and lessons for systems without a hard disk. The practice sessions interspersed throughout the lessons encourage you to try out the commands just covered. Troubleshooting sections following each lesson explain DOS's frustrating error mes-

The on-line DOS Quick Reference is extremely useful—even after the lessons are completed. Its extensive help screens can be summoned whenever there is a question about a DOS concept or command. Furthermore, you can return to DOS and execute the command while help remains on-screen.

Microsoft's Learning DOS is a great way to learn how to harness the power of DOS. Power users may find that it is the perfect gift for every neophyte they

List Price: Learning DOS, \$49.95. Requires: 256K RAM, DOS 2.0 or later. Not copy protected. Microsoft Corp., 16011 NE 36th Way, Redmond, WA 98073; (206) 882-

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Corporate Maneuver.

In the high-pressure corporate environment, every move counts. It's no wonder, then, that many corporate PC users are reaching for WordPerfect for powerful word processing.

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WordPerfect is now the best-selling word processor for the IBM PC, according to market research firm InfoCorp. And customers like Ford, Chrysler and TRW are leading the way.

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But WordPerfect's climb to the top was no overnight success story. For the past three years, user feedback has been applied to each new version of WordPerfect, pushing it closer and closer to perfection. The result is WortPerfect 4.2, a word processor with unsurpassed business features for the IBM PC and compatibles. Features like an elegant thesaurus, a 115,000-word spelling dictionary, document summary, columns displayed side-by-side on screen, windows, line drawing, statistical twping, and extensive printer support.

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There is a word processor that is as productive for executives as it is for secretaries. WordPerfect 4.2. It's the consummate corporate maneuver. For more information, call or write WordPerfect Corp., 288 West Center St., Orem, Utah 84057, 6801) 227-4000.

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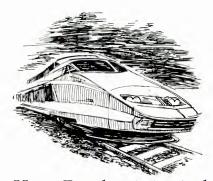
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 B. EGA. MIA. Revisels software displayed was interfacing. Pluckering effect of interfacing reduced with parkase of last glare screen filter.

CIRCLE 540 ON READER SERVICE CARD



How a French train inspired the fastest 286 micro you can buy.

Not just any French train, but "La Grande Vitesse"-"The High Speed." It's the fastest train in the world, routinely eating up steel track at speeds normally associated with small aircraft.

It was during such a screaming ride that we christened our new, high-speed micro . . a superfast 12MHz 80286 microprocessor operating at Zero Wait State.



"Grande Vitere high speed—in this case, 12Mhz

286, and it's the very first 12MHz No-Wait-State micro available outside a research laboratory. To design a machine that operates reliably at 12MHz with no wait states, our engineers had to come up with some major innovations.

And they did

A power user's dream

The GV-286 is the first 80286 micro to include a high-speed RAM cache circuit, making data retrieval from the processor almost instantaneous It's the same design feature that makes our new GV-386 the fastest machine in that ranfied category. The cache circuit also assures high reliability. allowing the GV-286 to operate at super-high speeds without pushing its integrated circuits

beyond their design limits. Other 12MHz machines out their ICs through hell to achieve high speed, and that means they're inherently less reliable.

Yet with all this speed and design innovation. PC Designs engineers—unlike other manufacturers have customized the BIOS and retained the standard IBM PC-AT bus timing (yet another PC Designs exclusive). The result is unparalleled

compatibility with existing software and peripherals. There's a boxcar load of other design features and the GV-286 can be ordered up in virtually arw configuration you can imagine. Best of all, standard systems start at less than \$4000 (including Desqview multitasking software).

Enter the No-Wait-State

If you've been holding out for a 80286 micro with the speed of a bullet train and the reliability of the family station wagon, your wait state is over.



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19 Rector St., Suite 2705, New York, NY 10006

PCED 1.01a: A DOS Essential



PE HANDS ON

BY EDWARD MENDELSON Every time you type a DOS command you use a text editor, but it's so primitive that you might never notice it. The DOS command editor doesn't do much. You can delete backwards and press either F3 or the right cursor key to retrieve your last command, but that's about all. Users have tolerated this because they didn't know they had an alternative. The alternative is PCED-the professional command editor. PCED is to the DOS command editor what

WordPerfect is to EDLIN. It's also a model of intelligent design. You don't need the manual to make the program do useful work. You simply run it. Because PCED isn't a clunky DOS shell, the command line looks the same as ever-but it is now responsive rather than recalcitrant. The cursor keys cycle through your earlier commands, which you can modify or reuse, and the editing keys act the way you expect them to.

But that's just the beginning. Read the manual and you can use PCED to create macrolike "synonyms" for complex series of commands, complete

```
with variables and parameters.
PCED's synonyms, unlike
batch files, stay in memory, so
they work instantly whenever
you're in DOS, and they can be
revised or replaced on the fly. If
you want to save a set of syn-
onyms for daily use, they occu-
py a single ASCII configuration
```

```
"numer hat illhed all htrush"
"heute Bhil path apatha"
"r cin scopy of hi /s /d Am Bd-By
       steck
                                       2000 (1000 free)
2000 (1752 free)
2000 (1752 free)
re list
```

In the middle of a command, you can tress PCED's status key to see a list of user-defined command synonyms. You can then pick up where you stopped



PCED, Version 1.01a The Cove Software Group P O Box 1072

Columbia, MD 21044 (301) 992-9371 List Price: \$35 Requires: 64K RAM, DOS 2.0

In Short: An ingenious, flexible DOS command processor with multiple functions, including usage logging. It makes DOS easier for beginners but also has simple programming capabilities for advanced users. Not copy protected. CIRCLE 424 ON READER SERVICE CARD

file that doesn't hog disk space. PCED can memorize the parameters you use with a command or program, so that every time you enter "format" it will add "b:\s". PCED synonyms can also include replaceable pa-

(continues an page 54)

Spreadsheet Detective Keeps Tabs on Cells. Solves Errors



HANDS ON

BY JARED TAYLOR Spreadsheet Detective from Deucalion Resources Group makes it easier than ever to debug a spreadsheet. Not only does it give you X-ray vision into the heart of your model, it wraps itself around SuperCalc or 1-2-3 and behaves like an organic part of it. You never have to switch between spreadsheet and analyzer because Detective is always there, ready to catch bugs and exterminate them on the spot.

When you run Detective, it loads first and then loads your spreadsheet. Then, whenever you need to use it, Detective springs into action when you hit All-F7. It takes up approximately 140K bytes of extra memory, unfortunately, and so you have less room for model building. When you don't need Detec-

tive, your spreadsheet behaves normally, except that it displays the "symbolic name" of the current cell. This is a clever invention that identifies each number cell by the contents of the nearest label cells, above and to the left. Thus, if the current cell is in the "1st Quarter" column and in the "Net Profit" row, the symbolic name of the cell is "1st Quarter, Net Profit." and it appears at the bottom of the screen. The actual labels may be nowhere in sight, so it's like having titles set in your

spreadsheet all the time. Once you call in Detective, it rounds up the usual suspects: circular errors, reversed ranges, empty unformatted cells, unreferenced constants, and other spreadsheet criminals. It crossreferences a worksheet to show

which cells reference each other and maps it to show a bird's-eye view of the format. But Detective is at its best when it's probing formula logic. Other programs can show you what's in a cell, what's in the cells referenced in it, and so on. But Detective shows cell relationships three ways:

· As normal formulas: for example, the contents of E18 are E16/F4 · As actual values: 10,000

· As symbolic names: (1986, Average Sales) is (1986, Total Sales)/(1986, Number of

Formulas make much more sense when you can see names and values

Months)

Finally, you can change your model while you're in Detective: it doesn't allow you to forget the fix while you're switch-



Spreadsheet Detective Deucation Resources Group 538 N Division Ann Arbor, MI 48104 (313) 668-1333 List Price: \$89.95

copy protected.

Requires: 130 to 140K RAM above the minimum necessary to run your spreadsheet, 1-2-3 (Release 1 A or 2.0) or Super-Calc3 or 4. DOS 2.0 or later In Short: A handy RAM-resident utility that will keep track of spreadsheet cell relationships and catch trouble spots. Not

CIRCLE 421 ON READER SERVICE CARD ing back to the spreadsheet.

Spreadsheet Detective is slow at catching CIRC errors, and its manual is a little foggy, but if you can give up 140K bytes of RAM, it could pay for itself in half an hour of spreadsheet sleuthing.

Today's 386 compatibles fall into two categories:

Those that "enhance" technology.

The PC Designs GV-386 is not an enhancement. It's the fastest 80386-based compatible you can buy.

That's because the engineers here at PC Designs realized early on that to take full advantage of the 80386 chip, an equally revolutionary motherboard was needed.

So they started with a blank piece of paper andfrom the ground un-designed a 80386 micro that blows the doors off every other compatible available.

Get Power Hungry

At the heart of the GV-386 is a 32-bit processor operating at 16MHz clock speed; keyboard switchable to 8MHz (it will even support 24MHz operation, once Intel makes that available).

And that's Zero Wait State clock speed, thanks to a specially-designed, high-speed memory cache circuit. When enabled, this unique circuit—with a full 64K of static RAM-allows you virtually instant data retrieval 80 percent of the time.

The cache circuit-a PC Designs exclusive-also ensures rock-solid reliability because it eases the load high speed puts on the integrated circuits. Even at zero wait state, the GV-386 never exceeds IC design specifications.

Radical, but compatible

Despite its radical innovations, the GV-386 was designed to retain the standard 8MHz IBM PC-AT bus timing. The result is unparalleled compatibility with existing software and hardware

And every GV-386 is bundled with Desqview 1.3 from Quarterdeck Office Systems, giving you both expanded memory management and multitasking capabilities allowing up to nine simultaneous operations.

Affordable power

If all this speed and performance doesn't blow you away, take a look at the price: The standard system starts at around \$4000. And it's available now

The fact is, it's the most innovative compatible to date. So why settle for an 80386 machine that just "advances" technology, when the GV-386 blows it away?



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And those that blow it away.



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System 386

"Johnson attributes the speed difference to the 68020's efficient on-chip instruction cache and the full 16 MHz 80-bit 68881 math coprocessor (which speeds up processing of floating-point computations) vs. the slower 8.0 MHz 80287 coprocessor on the Deskpro 38." -Press release for Levco's Prodigy 4 Macintosh enhancement board.

Thanks, but We'll Wait for PageMaker Savvy magazine described eight

business opportunities for women who want to be their own bosses. Number one was desktop publishing. Also on the list: hazardous-waste removal and drug testing.



Hemingway Wept

"NEW YORK-In the Guggenheim Museum, an exhibition of sculptures created to stand all alone in forests and deserts, far from civilization, seemed at odds with Microsoft Corp.'s introduction, at the museum, of a word processing package designed to integrate Apple Computer's Macintosh into corporations and create a bridge, if tenuous, to the IBM personal computer environment."

-57-word lead sentence. MIS Week, November 3.

It Must Be Single-Sided

"Atari 1050 Disk Drive. features 127 bytes of data storage capacity. Now \$139.97."-Ad for Lionel Kiddie City, Baltimore Sun. December 22, 1986

Elementary, My Dear Watson

"For installation, the computer keyboard is plugged into PC Type Right which, in turn, is plugged into the computer's keyboard." -MIS Week, November 3,

/inter vonder.

The temperature's fallen and so has our price on one of nottest computers ground. The penuine IMMXT.

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The spelling checker is extra at additional cost. (From the Lynchburg (Va.) News &

Daily Advance.

Heard or seen anything offbeat, unusual, or just plain dumb about the computer ind try? Send your offerings to Communiqués, PC Magazine, One Park Avenue. New York. NY 10016; (212) 503-5293 or MCI Mail 157-9301

Contributors receive \$50 and a PC Magazine T-shirt. Contributors this issue: L. Mark Compter (IMMXT), Jim Seymour (Deskpro 38), Patricia Phelps (award-winning lead, keyboard), Maarten Calon (Atari drive).

PCED (continued from page 52)

rameters that stand for the current disk drive, path, date, time, and much else. This lets a oneletter synonym automatically tell a program like Jet or DOS's XCOPY to back up all files that have today's date. You can even train a PCED synonym to record the date in the configuration file after doing a backup, so that you can use the same synonym later, and it will back up any files created since the last

day you used it. With PCED you can make a silk purse out of DOS's ear. Do

you ever need to edit your system's path? Normally you have to retype it three times before you get it right. With PCED you call up the existing path and edit it the same way you edit other commands. Or, you can assign synonyms to individual users and generate an automatic log of their computer activity.

The package includes programs that work with PCED to create resident commands that any self-respecting DOS would have included long ago. One command provides a customizable directory, another changes file attributes, one recalls text that scrolled off-

screen, another feeds keystrokes into applications, while yet another lets you invoke SideKick within PCED synonyms. Programmers can write more commands using the guidelines provided.

Since PCED does its work only in DOS, it won't gum up your applications. If you make "Venus" your PCED synonym for "dir \solarsys\morning." you can still type "Venus" in our word processor and get "Venus." There's one excention to this DOS-only rule. With certain programs, notably DE-BUG and SYMDEB (the de-

bugger that comes with Micro-

soft's Macro Assembler). PCED provides a separate set of "user synonyms" that can help programmers keep their sanity while they suffer through a night of repetitive tasks.

PCED is crashproof, doesn't care when it's loaded, and never gets in the way. At 16K bytes, in its smallest configuration, it's compact enough to use with a floppy disk. Everything it does can be modified, suspended, or suppressed. It does have one disadvantage. If you use someone else's PC after you've installed PCED on yours, you'll feel as if you're driving a gasguzzling old wreck.



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WYSEpc 286, you can also choose the keyboard that's the best fit: either the standard AT-style, or the IBM Enhanced PC keyboard. And you get the complete compatibility you should expect in every other way, including more than 350 tested off-the-shelf software packages.

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The Innovative Leaders

■ PC UPDATE ■ PEGGY GAVAN

MicroPro International Corp. has added more than 125 enhancements to WordStar Professional, Version 4.0, in its first upgrade since Version 3.31 was released in April 1983. Some of the new features include an on-line 220,000-word thesaurus, 40 programmable function keys, full path support, LAN support, and a built-in 14function calculator. MicroPro is also offering new legal, medical, and financial dictionaries for \$25 each. Version 4.0 is priced at \$495 for single-user systems and \$595 for the LAN file-server version. LAN node versions are priced at \$150. Registered users who purchased WordStar Professional, Version 3.31, between December 1, 1986, and March 31, 1987, will receive free upgrades; all other registered users can upgrade for \$89, plus tax and \$5 shipping. Corporate customers can purchase updates from their dealers at discounted prices. In addition, MicroPro is offering new purchasers of Version 4.0 a \$100 cash rebate or the opportunity to receive more than \$300 worth of add-on productivity software. MicroPro International Corp., San Rafael, Calif.: (800) 227-5609.

IBM Corp. has reduced the prices on two models of the PC-XT and one model of the PC-XT. The PC-XT Model 286—with 460K bytes of RAM. a 1.2-megahyte floppy flisk drive, and a 20-megabyte hard disk drive—and its price tag basked by 5600 to 250; the price of the PC-XT Model 089—with 640K bytes of RAM. a 50K byte for polis drive; and 20-megabyte hard disk drives—dropped from \$2.985 to \$2.600. The PC-XT Model 086, while 20% bytes of RAM and a 1.2-megabyte floppy flish drive, and will 260k bytes of RAM and a 1.2-megabyte floppy flish drive, is 180 to 250 bytes of RAM and 1.2 megabyte floppy flish drive, is 180 Edward 260k bytes of RAM and a 1.2-megabyte floppy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte floppy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte floppy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte floppy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte floppy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte floppy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte flippy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte flippy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte flippy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte flippy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte flippy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte flippy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte flippy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabyte flippy flish drive, is 180 Edward 260k bytes of RAM and 1.2 megabytes flight and 180 Edward 260k bytes of RAM and 1.2 megabytes flish and 1.2 megabytes flight and 180 Edward 260k bytes of RAM and 1.2 megabytes flish and 180 Edward 260k bytes of RAM and 1.2 megabytes flight and 1.2 megabytes flight and 180 Edward 260k bytes of RAM and 1.2 megabytes flight and 180 Edward 260k bytes of RAM and 1.2 megabytes flight and 1.2 megabytes flight and 180 Edward 260k bytes of RAM and 1.2 megabytes fli

Louis Development Corp, hos begun hipping Louis Frederic Mgp, a collection of map set designed for use with the Marker Frederic Plus graphics package. Frederic May consists of Viseptiale state: Continents and Countrie, U.S. Coundier, U.S. Digit ZP Codes, U.S. Major Cities and Metropolium Statistical Arcas, and the J.S. Complete Set (includes all the U.S. set and U.S. Congressional Districts). The U.S. Complete Set reliable for congressional Districts 1, The U.S. Complete Set reliable for congressional Districts 1, The U.S. Complete Set reliable for congressional Districts 1, The U.S. Complete Set reliable all the U.S. et al. (1997).

Quadram has added the Microfazer VI to its line of Microfazer print buffers. The new model is equipped with six ports—six serial or four serial and two parallel—that allow up to five PCs to share a



The long-awasted WordStar Professional. Release 4.0, has more than 125 new features, including an on-line thesiasriss and a built-in 14-function calculator. printer or plotter. In addition, the Microfazer VI features graphics and nongraphics modes for handling text or 1-2-3 files. List prices for the Microfazer VI are \$995 for the 256K-byte version, \$1,195 for 512K bytes, and \$1,495 for the 1-megabyte model. Quadram, Norross, \$Ga; (404) 923-6666.

Epson America has introduced the FX-86e and FX-286e dot matrix gruiners, enhancing its FX-85 and FX-286 models. The new models ofter additional of not selections, including standard roman and same serif near-letter-quality fonts supporting piez. Life, proportional, the propertional properties of the properties of the

AutoSHADE and Auto-CAD AEC Mechanical, two new enhancement programs for Auto-CAD, are new available from Auto-Cab, are new available from Auto-Cab, are most available, priced at \$500, is a full-color shade-rendering package that turns Auto-CAD DaC Mexings into sold images with color, perspective, surface shapes, and features. Auto-CAD DaC Mechanical, also priced at \$500, customizes Auto-CAD DaC for the needs of mechanical engineers who design building systems. Autodesk, Sausalito, Calif.; (415):331-3036.

US Robotics is offering qualified electronic bulletin board system operators a discount price of \$495 on its new 9,600-bit-per-second



Courier HST modem, which is regularly priced at \$995. In addition, the company is reducing the prices on all Courier 2400e, Courier 2400, and Microlink 2400 modems that are sold to BBS operators by \$300. For

2400 modems that are sold to BBS operators by \$300. For more information, contact US Robotics at (312) 982-5001 (voice) or (312) 982-5092 (data).

Ricoh Corp. is bundling a complimentary package of SoftKey Software Products' KeyPark with is LP 44080 Haser printer. KeyPark, which regularly sells for 5395, combines three separate applications for primer utility control, business graphics, and mailing-sits generation. The LP 40800 is priced at \$33,495. Ricoh Corp., Wext Caldwell, N.J.; (201) 882-2000.

Broderbund Software has released the Graphics Library: Holiday Edition, a collection of graphics, fonts, and borders for use with its The Print Shop program. The Holiday Edition, which sells for \$34.95, contains more than 100 design elements for 26 holidays. Broderbund Software, San Rafael, Calif.; (415) 479-1170...Aldebaran Laboratories has dropped the price on Source Print, Version 2.02, to \$75, a reduction of \$22. This cut follows a recent cost reduction of Source Print from \$139 to \$97. Aldebaran Laboratories. Pleasant Hill, Calif.; (415) 930-8966... Computer EdiType Systems has dropped the prices on its Magic Series line of document production software for WordStar. MagicPrint is now \$99. MagicBind is \$149, and MagicIndex is \$199-down from \$195, \$250, and \$295, respectively. Computer EdiType Systems, New York, N.Y.; (800) 251-2223...Windows for Data, Version 2.0, has several new features, including foreign-language compatibility, multiple-choice fields, and an internal debugging system that traces errors and reports memory corruption. Registered users should contact Vermont Creative Software at (802) 848-7738 for information on pricing and upgrading...Financial Aids I, previously available for use only with Symphony, is now available for 1-2-3, Release 2.0 and later. The templates sell for \$39.95 and can be ordered from J-Rander, Cincinnati, Ohio; (513) 232-6702.

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Javelin is the only software package that accelerates the budgeting process. It not only puts the data at your fingertips, but it gives you the power to organize data, reveal your logic and your assumptions, and then communicate your analysis quickly to others.

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The heart of Javelin is the way it stores information and lets you use it. You enter variable names in English (the way you normally think of them), and define the relationships between those variables. What's more you can simultaneously check your logic and assumptions.

When it comes to worksheets, Javelin affords you a limitless number which are naturally linked together. That means you can share data among them automatically. Think of the time this saves, and the errors it eliminates.

LUP BUILDING BLOCK

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And when you change data, Javelin instantly reflects those changes everywhere those data reside - multiple worksheets, tables, graphs, and logic.

Use any of Javelin's 10 views: Table view, Formula view, Diagram view, Chart view, Worksheet view, Notes view, Errors view, Quick graph view, Graph view, and Macro view. Or split the screen and use two at a time.

It's a good feeling to know that as vou're doing your budget, you won't get lost along the way. Javelin's exclusive audit trail traces your logic, and lets you share your assumptions with others.

Then there are the Javelin building blocks, built-in tools designed to speed up the budgeting process. For example, you build your organization chart and Javelin does consolidations automatically. Our built-in calendar lets you automatically roll days into weeks, weeks into months, months into quarters and quarters into years.

This product is so valuable that INFO-WORLD magazine named Javelin "The Software Product of the Year" and PC MAGAZINE gave us "The Technical Excellence Award."

One user, Kathryn Wilson of Raychem Corporation was so impressed she wrote: "It's amazing how much time you

can save. I can set up models in minutes rather than hours or days with Javelin's innovative and powerful features...the difference in time spent building applications can be as much as 10 to 1 over traditional spreadsheets."

Is there any reason for you to wait another second?



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now or to find the name of the dealer nearest you. MasterCard, VISA or American Express accepted. Or simply send a check to us at our address at the bottom of this ad (\$199.95 per copy, plus \$5 shipping for the first copy, \$2 for each additional. Massachusetts customers add \$10 sales tax per copy).

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PLEASE SHARE THE SOFTWARE



Even as the cost of development skyrockets for big software houses, the shareware market is thriving. What makes it tick? Here are three shareware success stories.

hareware is big news these days, and it seems to fly in the face of the conventional wisdom that you need a big development staff and a bigger marketing budget to make a product a success. Products created by individuals and sold outside normal distribution channels are gaining respect and making big money.

One of the distinguishing features of shareware is that you can generally download the programs from computer bulletin boards or pick up the disk at a user group meeting. You try the program, and if you like it and use it you pay the registration fee. Otherwise, there's no investment.

Let's take a look at three new shareware products to see how they fit this simple formula and how they stack up against their commercial competition.

ProComm is one of the more obvious successes in the communications software market. The comm market is especially interesting since it was started on the PC by the granddaddy of shareware programs, PC-Talk. ProComm tips its hat to its progenitor by retaining many of its keystrokes. But there the resemblance ends. It's a full-featured comm program, with more protocols than any program I've seen. At the same time, it's slick, with good installation, nice use of color, and 'exploding'' windows that zoom into view. A command language and macros make ProComm competitive with the best comm programs on the market. The functionality is fantastic, and the

rice functionality is fantastic, and the price (registration fee) is a painless \$25, \$50 if you want the printed manual and access to a support hot line. Unbelievably,

the authors offer quantity discounts as deep as 40 percent to corporate purchasers. ProComm's creators, Tom Smith and Bruce Barkelew, are both amazed at their success and ready for more. While they intend to continue to support ProComm.

success and ready for more. While they include to continue to support Pro-Comm, they envision a commercial version with a higher price tag and even more features. Ironically, the individual users, the ones to who were the biggest supporters of Pro-Comm during its infancy on the building boards, are the least conscientious about registration fees. Corporate users, on the other hand, there are dispert, despite the contract of the property of th

ANOTHER WORD PROCESSOR? Move over, PC-Write, here comes New York Word. NYWord is not for everybody. While it sports all the features you'd expect in a modern word processor, the user



interface is unconventional. In a sense, it's a cross between WordStar and EMACS, one of the great minicomputer-based text editors. NYWord's Spartan display uses only one line for status, leaving the other 24 for text. Its help messages are cryptic, and the Alt- and CtTl-key combinations aren't always memonic.

But behind NYWord's ruggedly individualistic user interface is its real power: many of the commands take arguments or are parameter driven. You can press Alt-J to justify a single line of text. Or you can press the Esc key, the 5 key, and Alt-J, and it will justify the next five lines. This is clearly a word processor for people who enjoy thinking about the processing of words. Devotees argue that it's considerably faster to issue such commands than to turn on text marking, move the cursor, issue a text processing command, and disable the text marking, as is common with most other word processors. They're right, but you have to want to be fully engaged with the process in order to be good at it.

In case you're beginning to stespect that M'Word is a programme's test editor that got dressed up as a word processor, cossider that it has banders and footers, footnotes, spelling checking, multicolumn printing, muth calculations, widow and orplan control, and a heavy-duty merge facility. It also has the most powerful searchand-replace this is do of N/Write, and it has an index generator and cnell fills is a many as 12 windows simultaneously.

Of course, the documentation needs to have a close encounter with someone other than the program's author, and the key as-

■ FROM THE EDITOR'S SCREEN

signments aren't what I would have chosen. But this is one powerful product, especially for its registration price of \$35.

RamNet is perhaps the most ambitious of the current crop of shareware, a cross

between an RS-232 network, electronic mail, and a bulletin board system. RamNet is a terminate-and-stay-resident program that communicates with other RamNet-equipped PCs, whether they're hooked up

by wire running from one RS-232 port to the next or by knowing the phone numbers of modern-equipped PCs. Networks of PCs can communicate with other networks of PCs under RamNet, a slick combination

of wide- and local-area networking.

RomWer is especially noneworthy for
the degree to which it is frought out. Plats
password protection and security features
specially reasonable and the second protection and security features
abundance of attractive features, including
comprehensive electronic mail, a bulletin
board, communication with UNIX mail
systems, and a powerful command linguage. It's not for local device sharing or
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You'll probably want to know more about these products, so here are some phone numbers: ProComm: (314) 449-7012; NYWord: (212) 245-6510; RamNet: (212) 889-6431.

COMMERCIAL COMPETITION Do these and other shareware products compete with commercial counterparts? Yes, no, and maybe. The shareware market is a gentler clime than the retail/commercial market. It's a place where authors can try out new ideas, hone their programming market. It's a place where authors can try out new ideas, bene their programming market. It's a place where authors can try out new ideas, to the programming the product of the programming angular than the product of the product of the programming the product of t

But some products graduate from shareware to take their proper place among the good and great programs. The price in variably goes up, but the marketplace benefits from another worthy competitor.

benefits from another worthy competitor.

And then something like RamNet comes along, a unique blend of features testing the waters to see if there is a need for such a product. I predict there will be.

Now, how is it possible that a programmer or two, working in relative isolation, can best the giants at their own game?

can cest the gatast at near own game?

Nothing, repeat, nothing, can stop you if you've got a good idea, the ability to actualize it, and belief in yourself. This is more than a pious platitude. If you don't have all three elements, you haven't got a product and you haven't got a chance.

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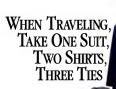
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ages like Symphony*. You can use a keyboard enhancer with the spreadsheet module Or deactivate it, enter the word processing module nd activate your favorite spell checker. It's easy. And you never have to back all the way out of

the program!

Referee puts an end to RAM-resident program conflicts. At \$69.95, it solves a very big problem for a very small price.

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THE KEY TO SOFTWARE SUCCESS



For the first time anywhere, the rules of the game that could make you rich. Forget about programming languages and customer relations—all you have to do is learn to count.

veryone knows that every so often some guy omes along with a sim-justic. but innovative, software idea and suddenly becomes filliny rich. We all think that someday the great software idea will come to us and make us rich, too. For many years I have tried to discover the key to success in software. I've finally dome it.

The key to success is in knowing how to number your software releases. That's all there is to it.

Pay attention.

DVORAK'S INSIGHT INTO THE SOFTWARE JUNGLE: The earliest available versions of a product are called alpha-test, then beta-test, versions. The alpha-test version is usually seen by only the developers and a few close friends. This is because alpha versions never work. These releases are usually numbered .00 to .59 or so. How something can be called Version .59 baffles many observers. I've always thought it should mean that the product is 59 percent complete. When you get to Version 1.0, the product is 100 percent complete. Version 1.4 means that 40 percent of the code has been rewritten or improved. Version 2.0 means the product has been completely redone.

Traditionally, the first public release of a product is called Version or Release I.0. Smart money always avoids Version I.0 and waits until Version I.0 or later is released, since Version I.0 is notoriously bug ridden. Well, maybe that's how it should be for clarity's sake, but marketing considerations should prompt software

sellers to take a new look at this releasenumbering scheme. The goal is to make the buying public think that you know what you're doing.

DVORAK'S RULES OF SOFTWARE RELEASE NUMBERING. Always tare a decimal point in the number. Never release a Version 1, 2, or 3. This does not appeal to the micro user's subconscious mind. You have to release 1.0, 2.0, or 3.0. It's even better to use two places and release products with release numbers such as 1.15, 2.35, and 3.20.

Start with Version 2.0. The key to success is understanding the psychological effect of the numbering scheme. The smart software vendor will start with Version 2.0. The back with all the earlier numbers, as a quick way to get recognition. Astron-Tate knew this when it released dB/ASE II. There was never a dB/ASE I, was there? People will think you've been



in business a longer time when they see Version 2 of your product.

End with Version 3.0. Never release a

product with a number higher than 3.0 to 3.4. If you have to release a Version 3.45 or some such nonsense, get ready to fold

the company.

Simply put, Version 3 is the last version of any software package you'll ever need. If you happened to find a company that released Version 4 of a product, you'd discover that all the original creative types responsible for Versions 1 to 3 had long since flown the coop. Version 4 has to be a kludge.

Microsoft knows this. It never released Version 4.0 (in this country) of its MS-DOS for fear of overextending the product—giving people the impression that it was stale. If upgrades continued, you'd eventually have something like MS-DOS, Release 134.6.7. The product would be a laughingstock. "Can't they ever get it right?"

Therefore, Microsoft will promote A-DOS or CP-DOS 1.0 and start over again rather than release MS-DOS 5.0. Very smart thinking.

DVORAK'S SECRET TO A QUICK BUCK: Now it seems to me that if you had a hot software package and you wanted to make a quick buck with it, then you'd release it as Version 3.0 with a sticker on the box that boldly proclaimed it as

"NEW! Version 3.0."
You'd rake in the easy money and retire early. That's all there is to it. Great business, huh?



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documentation, quality, service, manufacturer's support, compatibility, thirdparty support, features,

party support, features, conformity and performance, he and his VP of engineering came to one conclusion: "To praise Microport is to praise the ATAT/Intel joint venture, because Microport's version of UNIX System V is virtually identical. However, more value

is received since more middlemen are removed that's much closer to buying direct and selling direct."

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Team Use for The AT.

INSIDE TRACK

Some say the new open-architecture Mac will leave the PC feeling claustrophobic. But what do they know?

A pple Slated to Become IBM Com-patible This Year. Many of my friends say they can't talk to me. They're under nondisclosure, they mumble. It's the hottest thing they've ever seen. "Even you'll be impressed." Then they say, "It's from Apple." I am baffled. Then one day, as I am finishing a diatribe for a local paper, a bigshot editor calls me and tells me that even I, Dvorak, the tormentor, will buy the new open Macintosh. He tells me, "Sculley has said privately that after this machine appears, the compatibility problem will be IBM's problem." Harsh words-bravado or a bluff? Whatever the case, expect to see Apple products reviewed in the pages of PC Magazine by this time next year. Apple has plopped an 80286 card running MS-DOS and a special version of Windows into its forthcoming Macintosh machines. The hottest of the group-the Paris workstation-already has a screaming 16-MHz 68020 driving it.

Then again, I've been hearing this kind of malarkey for a year. It's possible that Apple can sell a few AT-compatible machines to the world of the PC, but its pricing strategies and image will prevent any real market penetration. This is despite the declarations of a few columnists who claim that the Mac is the "in" machine in the world of business. What have they been smoking? Apple is viewed by too many people as a toy computer or a yuppie computer. The Apple II, for example, is seen as a school kid's computer or a game machine. Let's face it: it's an old home computer. And take the Mac (please!). The Mac is, at best, the front-end to a desktop publishing system. Great for newsletters if you like little screens. It's also a vuppie computer and an easy-to-use computer for dopes.

Notice the word business doesn't appear here. (Oops-it just did!) Apple simply cannot get on the desks of the corporation in any numbers. So it decides to redesign the Mac and turn it into a combo Mac/80286-AT compatible (just as the 386-class machines gear up). What can we expect from this strategy? Well, not on the above list is an overlooked generality about Apple. Apples are high-end machines. The company does not sell bargains. Apple still sells its Apple II line for about \$1,000 per machine, while an Apple II lookalike from Hong Kong, the Laser 128, can be had for \$300 to \$400. Also overlooked in the big picture (but not for long) is that businesses traditionally buy computers not because of features or software, but on a cost-permips (millions of instructions per second) basis. Because of its high prices, Apple can't compete in the business mips market with the cloners. Add to this roadblock the tendency at Apple to do a mediocre job on its software. The company still hasn't been able to design a reasonable file server for its AppleTalk network. We'll see what happens.

Politics Dept.: All hell has broken loose amongst the information providers. While the Commerce Department wants to turn the U.S.A. into the world's information provider, the Defense Department and the National Security Council want to stopper the flow and availability of information from sources such as Lockheed's Dialog, Just before Admiral John "Irangate" Poindexter headed toward the shredding machine, he penciled a controversial memo that defined most on-line information as "sensitive." Maybe he should have logged onto CompuServe's CB to take a look at what's really going on.

Nifty Utility Dept.: Get a copy of Hotshot from Symsoft for \$99.95. It allows you to shoot a snapshot of a screen and then manipulate it, draw on it, cut and paste it, and export it to a printer or to PageMaker or Ventura Publisher for insertion into a document. Quite fancy. Call them at (415) 962-9500 for more information.

This month's Cute Product Award goes to Microsoft for its special font cartridge (#92286Z) for the Hewlett-Packard Laserjet. For use with Microsoft Word, the cartridge contains four different point sizes of both Times Roman and Helvetica (actually Helv and Tms-clone fonts!). It's the best all-purpose font I've ever seen for the HP Laserjet. The suggested retail price is a hefty \$330. Ouch! Too high.

Joke Dept .: If you have the chance to get on some of the big-time national networks, such as USE-NET or UNi-Net, you should be able to find a group called Net.Jokes or some such thing. In there I found this IBM joke-the only one I found specific to IBM.

Three women are sitting in a bar discussing their lovers. The first says, "Mine's a wrestler. He's really forceful and aggressive in bed." The second says, "Mine's an artist. He's delicate and gentle." The third stares bleakly at her drink, "Mine sells IBM equipment," she says. "He sits on the edge of the bed and tells me how good it will be when I finally get it."

Tasteless? Poignant? Who knows? Don't you think we can do better? If you've heard an IBM joke send it to John C. Dvorak's Inside Track Joke Contest. PC Magazine. One Park Avenue. New York, NY 10016. I'll print the best ones and crown a winner. Send a self-addressed, stamped #10 envelope with a joke, hot tip, or interesting observation and I'll send you a PC Magazine/Inside Track pocket protector. A fantastic collector's item!

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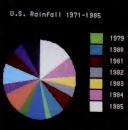
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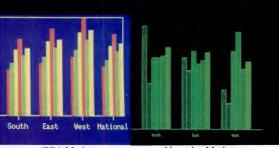
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Bob set up dimensioned screen variables for the days of the month and a screen pointer for selecting a date, and he was done. Then Screener generated the code. Then Bob drew the appointments window, built an appointment file, filled in the connecting code and tested it - ONE HOUR AFTER HE STARTED!

Testing was a breeze. Screener doesn't just write code, it compiles your source, dispays a screen, gets the changes, then replaces the old code in your program. So here are Bob's appointment screens. You can see the source listing to the right.

We marked all the code Screener wrote for him.

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EXPLORING FLOATING POINT



When numbers get messy, PCs deal with them by using floating-point arithmetic. Over the next few columns, Norton will be exploring the different ways that PCs handle this job.

or PCs are basically designed to work with two kinds of numintegers) that aren't to terribly big, and messy numbers that get really big or small or that involve fractions. This messy form of numbers is called floating point, and I'll be talking about it over the next few columns. (I'll be covering some of the basis, but even if you know all about floating point, bear with me, because something interesting is coming up.)

Floating-point numbers are used by all the programming languages under a variety of names. In BASIC, floating-point numbers are called single and double pre-cision. In Pascal they are called real, and in C they are called float. They are used in spreadsheets in an automatic, behind-the-scenes way (the spreadsheet programs use whichever number format, integer or floating point, suits the needs of the numbers at hand).

While the integer format can be used to hold a limited range of numbers in an exact way, the floating-point format is designed to represent a very wide range of numbers, not necessarily exactly.

TWO KEY PARTS In order to do this, floating-point numbers are built out of two key parts—the part that holds the digits (for argument's sake, let's say the digits are 12345678) and the part that indicates where the decimal point belongs (for example, it could belong between the 2 and the 3, which would make our number a little ower 12; or it could belong two places to the left of the 1, which would make our make or. number roughly 1/100. This second part "floats" the decimal point wherever it's needed, including, as our example suggests, far off to one side or another.

By floating the point, the number could become very big or a very small fraction. How much it can float sets the dynamic range of the numbers.

The digits part of the number, on the other hand, sets how precisely numbers can be represented. In the example above, we have eight decimal digits of accuracy, le principle, a floating-point number is only an approximate representation, but if a value can be represented exactly in so many digits, then the floating-point number will happen to be exact.

Overall, the precision of a floatingpoint number is set by the number of digits represented (and the number base that's used—our familiar decimal base of 10 or the computer's floorite, the binary system, or base 2). For example, ½ would be



represented exactly as a floating-point number in either base 2 or 10, while ½0 would be exact in base 10 but not in base 2, and ½5 would be only approximate in either base.

As I've suggested, floating-point arithmetic can be done in a variety of formats. The characteristics of each format determine several key things: how wide the dynamic range is (at the big end and the small end), how many digits of precision are used, and which number base is used.

If we know the inner workings of a floating-point format, then we know the range, the precision, and the number base. But the really interesting part is that even if we don't know the format, we can probe around and figure some of it out.

Years ago, I saw a program that was designed to do this very thing. To let you play around with the idea, I've translated it into BASIC (Figure 1). The idea behind this program is that it gently probes the edges of precision to see where the boundaries are. By this method, the program is able to calculate what the number base is, how many digits of precision are used, and if the leftover amounts of calculations are rounded or truncated.

The one thing that this program won't show, though, is the dynamic range of numbers. To do that, we'd have to be able to let our numbers get too big (overflow) and too small (underflow) and still keep on calculating. Usually, though, a program sin't allowed to do that, so this program just attempts to do what can normally be done in any programming language.

For my example, running this program

■ PETER NORTON

in BASIC shows that BASIC uses a number base of 2, that single-precision numbers have 24 hinary digits (double-precision, 56), and that rounding isn't done. If you work with Pascal, C, or any other lan-

guage, you can easily adapt it to explore the floating-point format in that language. The same ideas that underlie our BA-

SIC program can be used to explore the number format used in spreadsheets. Of

course, the program has to be turned on its head to fit into the spreadsheet scheme of things, but that's not a major obstacle. We can just set up a spreadsheet in which each loop in the BASIC program (for example, lines 140-160) is boiled down to its key calculation (line 150), which is iterated down a series of rows: for simplicity we ean skip the logic tests (line 140) and just inspect the results manually.

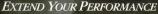
EXPLORING SPREADSHEETS To see how it works. I tried it out with spreadsheets from both 1-2-3 and Framework. The results were fascinating

1-2-3 came out with a fairly normal result: the base is binary, the number of digits is 53, and, if I worked it out right, rounding is done. Since Lotus publishes the specifications for its data, we can

 Floating-point format is designed to represent a wide range of numbers, not necessarily exactly.

check our results. According to the specification, numbers are stored with 52 bits of precision. At first glance our calcutation of 53 tooks like "close, but no cigar," But, tooking more carefully, the problem disappears—because the format that 1-2-3 uses. like many hinary floating-point formats, has an implied extra digit. So we're exactly right.

With Framework I got a different result: the number base came up as 10, showing that Framework does its arithmetic in decimal rather than in a form of binary. Calculating in decimal is intrinsically slower, which is why Framework isn't the champion of spreadsheet recalculation. But decimal can be more accurate in a practical (rather than theoretical) sense: in decimal-hased floating point, decimal fractions are exact so that \$.01 really is S.01 and not a close binary approximation. (Programmers long ago learned the trick of doing exact money calculations in binary floating point: avoid fractions by doing





CIRCLE 518 ON READER SERVICE CARD

PC MAGAZINE

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■ PETER NORTON

```
100 ' A BASIC program to investigate floating point
110
120 DEFSNG A-Z ' Set to single (SNG) or double (DBL)
136 A = 2.6 : B = 2.6 : ONE = 1.6 : TWO = 2.6
146 IF ((A + ONE) - A) <> ONE THEN GOTO 176
158 A = TWO * A
168 GOTO 148
178 IF (A + B) <> A THEN GOTO 288
180 B = TWO * B
198 GOTO 178
200 AA = (A + B) - A
210 THE.BASE. = AA
220 AA = THE.BASE.% - 1
230 IF (A + AA) = A THEN ROUNDING. % = 0 ELSE ROUNDING. % = 1
240 DIGITS. % = 0 : A = ONE : AA = THE.BASE. %
250 DIGITS.% = DIGITS.% + 1
260 A = A * AA
270 IF ((A + ONE) - A) = ONE THEN GOTO 250
288
                              ; "is the number base"
290 PRINT THE.BASE.%
380 PRINT DIGITS. * , "digits of precision"
310 PRINT "Rounding is " ;
320 IF ROUNDING. * = 0 THEN PRINT "NOT " ;
```

Figure 1: A BASIC program that investigates the floating-point format.

```
10 INPUT "Number base ? " , BASE
10 INPUT "Number base?", BASE
20 INPUT "Number base?", DIGITS
30 FACTOR = LOG (BASE) / LOG (2)
40 FRINT "One digit in this base equals";
50 FRINT FACTOR; "binary digits"
68 FRINT "Equivalent binary precision is ";
70 FRINT IN" (FACTOR * DIGITS* + 5)
 80 GOTO 10
```

Figure 2: A BASIC program that converts the precision of any base into its binary equivalent.

your calculations in terms of pennics, not dollars, so that the number 100 represents 100 cents, not 100.) Completing the calculations, I found that Framework figured its numbers to 18

digits and did not round off

than double-precision.

338 PRINT "done." 999 SYSTEM

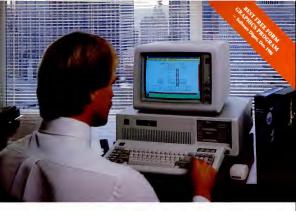
Now, what if we're interested in knowing whose calculations are more precise? It's easy to compare 1-2-3's 53 binary digits with BASIC's 24 or 56. Clearly 1-2-3 is much more accurate than BASIC's singleprecision, and less so (but not much less)

LOGARITHMIC SOLUTION But how do we compare against Framework or any other floating-point format that doesn't use a binary base? The answer is found in the mathematical formula that lets us convert the digits of one base into the equivalent digits of another. It's done with loga-

other and you get a conversion factor-how many digits it takes in one base to give the same precision as one digit in the other. Multiply that factor by the number of digits in the one base and you get their equivalent in the other. Figure 2 shows a simple program that will convert the precision of any other base into the bi-

nary equivalent. Using this program, we find out that Framework's 18 digits in the decimal base are the equivalent of 60 binary digits. So Framework gives us 7 more bits of precision (or a little more than 2 decimal digits) than does 1-2-3. That also further explains why Framework calculates more slowly-it's working harder to figure that extra

precision. That's a beginning look at floatingpoint, from the outside in. Next issue we'll turn things around and snoop at floatingrithms. Divide the log of one base by the point formats from the inside out.



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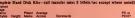


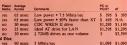
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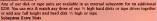


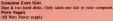


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Number Smaeher/ECM is 100% compatible with all hardware and software including EMS and EGA boards. The compatibility is a result of control: its speed is switch, keyboard or software selectable from 4.77 MHz to 12.0 MHz. Applications which have not been upgraded to ECM can still be nun by setting DOS to 640K or 704K and using the premoval bross DIOS for I/O expancers.

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Making the WORK GROUP WORK



We've learned how PCs make individuals more productive. Now a new class of software, led by Broderbund's For Comment:, is emerging that will make work groups work better.

uick: What's the Next Big Thing in personal computers? I can think of a half dozen reasonable answers. but I'm placing my bet on so-called work group productivity software.

We've taken PC hardware way past the limits of software that's available today and is likely to be available in the near future. Optical disks are slowly building momentum, in a process that seems to defy all human efforts at acceleration.

And existing single-user productivity software has settled into comfortable if narrow-minded categories, with a few dominant products in each and relatively little opportunity for newcomers. The probability of a new "hot" single-user software category appearing in the foreseeable future-the way PC CAD, outlining software, and project-management software emerged 3 years ago-seems very small. Present-day PC software has done

amazing things for the single user, providing leverage in productivity, creativity, and personal development.

Now it's time to bring PC-based tools and leverage to our immediate work groups, those people with whom we are in contact much of the workday. The old 80/20 Rule holds true for most of us: at work, 80 percent of our direct and important communications are with maybe 20 percent of our colleagues. (And when the rule fails, it's usually because the ratio is more like 90/10 or 95/5.)

Ergo, it's time for work group productivity software, which is just starting to apреаг.

Have you seen For Comment:? It was shown privately just before last fall's Comdex and appeared in public for the first time on the floor of the show. I have trouble finding people who've even heard of it, but take my word for it; once you see For Comment:, you'll be impressed. For Comment: is destined to be remembered as the first of this new breed of programs designed to help a group work together more productively.

TRACKS REVISIONS In the simplest view. For Comment: is a tool for tracking revisions in text documents. It allows each of several reviewers or coauthors of a work to annotate the text with questions, suggestions, and proposed new text. Excisions are saved and identified, so it's possible to take a For Comment:ed document back through a long trail of changes, deletions, and additions.

Each coauthor's or reviewer's work is



identified by his or her name and initials, with color-coding of additions and deletions to identify a change's source.

The primary author (that is, the originator) of a work prepares a first draft, then uses For Comment:'s Author Disk to read a native-format file from MultiMate WordPerfect, WordStar, or most other word processors' ASCII output into a For Comment:-format file, and to create a list of reviewers.

That file is then circulated to those reviewers, accompanied by a subset of the program that allows them to add comments but not delete others' remarks and additions

You can buy a "single-author" version of For Comment: for \$195. Users of this version will have to pass the Reviewer's Disk provided with the package around to colleagues, along with a data disk containing the document and revisions.

A NETWORK NATURAL The program cries out to be run on a network, to avoid that Floppy Frisbee routine. And Broderbund has a LAN version, for IBM, 3Com, and Novell nets, at \$995. Put For Comment: on a network, and passing a document through several rounds of revisions is a delight. (And with the network version, anyone can become an author, originating documents and creating reviewer lists.)

I said that in the simplest view, For Comment: is just a tool for tracking changes in documents. But put it on a network and tie it into a group working together and you have a powerful facilitator and motivator for getting that group in-

JIM SEYMOUR

volved in producing the best possible document. The kind of fast feedback and pingpong exchanges it provides are exactly what making small groups-as opposed to only individuals-more productive is all

about. Seen that way, For Comment: becomes a lot more than just a text-management tool

Not all the magic is in For Comment:. of course. Local area networks are more

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than just a new kind of medium for connecting machines; they quickly become a primary communications system for those who are on the net.

(I'm always baffled by employers who get cranky about workers using LANs for personal messages, such as to set up lunches and golf games. That's a fine way of learning the LAN habit and, when it begins to happen routinely, a good sign that people are accepting the LAN as nothing more nor less than another means of communicating with each other.)

But LANs alone aren't enough. We can swap versions of 1-2-3 spreadsheets on LANs right now, but the process isn't a tenth as interactive as working with text files under For Comment:.

■ For Comment: is a tool for tracking changes in documents. Put it on a network and you make small groups more productive.

Although all of us could come up with a long list of ideas for exotic work group productivity packages, I'm delighted that the first one to market focuses on joint writing projects.

Just as traditional word processors are easy, natural introductions to personal computers for many-because we all have to wrestle with writing things from time to time, and thus the results of word processing aren't an abstraction-a joint writingand-review program is a natural and powerful introduction for most users to the idea of making a work group more productive.

Like all good human interactions, working with a group on a For Comment:ed document is fun, and that's the final stimulus to jump in and do well. I find it interesting that For Comment: comes from Broderbund, the computer games people. Do they know something Lotus, Ashton-Tate, IBM et al. don't?



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The 386 provides immediate, major value to users, easily justifying its premium price. And, say, could you run out to the moon and pick me up some green cheese?

The seminar topic was "The 386: Miracle, Godsend, or Mere Boon?" Movers, shakers, and memory-chip makers were on hand to expostulate on their favorite topic.

I, alas, was not. My chariot was wedged amidst a sea of ancient locomotion lacking even a rudimentary real-time navigational system or accident-avoidance space.

Arriving late, I burried toward the conference room. My friend Olga, the besttooking and brightest analyst in the industy, emerged from the door in the threes of a choking fit. She gasped desperately for air. I reacted like an expert system. With 32-bit speed, I threw my arms around her. made a fist, and yarked it into her abdomen. A large gob of white tooked like a horized to the corridor like a rocket and landed with loud "ping." in a decorative spittoon. "Thanks," said Olga as her breash re-"Thanks," said Olga as her breash re-

"Thanks," said Olga as her breath returned. "You saved my life, and I will be your eternal debtor. However, the current position of your digits was never recommended by Dr. Heimlich. Unhand me."

mended by Dr. Heimlich. Unhand me."
My hands dropped to my side. "I didn't
think Tootsie Rolls were included on the
'Eat to Get Rich' diet."

"That," said Olga digustedly, "was no Tooise Roll. That was a gob of pure undigested stupidity from what some laughingly call the finest minds in the business. I guess it just stuck in my craw. You should hear what they're saying in there!"

"Fill me in."

"You've been to these things often enough to know. They started off with the

mutually congratulatory gush of introductions. Then they segued into the truisms."
"Such as?"

"The 386 is fast. The 386 gives you tons of virtual memory. The 386 does lots of important things in hardware to make protected-mode operation simpler. You

know: the actual facts."
"Sounds reasonable enough."

SCIENCE FICTION "Sure. Who can argue? Faster is always better. Bigger is always better. Bigger is always better. Handling off routine drudgery from software to herdware can't hurt. But for the finest minds in the business, that's just the opening chapter. From there they take off into Fantasyland. And they actually seem to think their science fiction stories have something to do with reality."

"Tales of the forthcoming software revolution. You know, a new wave of software unlike anything since the invention of



the printing press. It'll make computers easy to use. It'll give you untold power. It'll let you boldly step where the hand of man has never set foot."

"Besides the metaphor, what's so fantastic about that?"

"For openess, cost. Bigger and faster may be better, but cheager is better, too. Do you really need to pay the inflated price for a 386 machine just to put it on some clerk's deek for routine typing? Do you really need to give some junior manager a 386 too do simple accounting? The 386 machines are going to be for special situations and power users until they stop commanding a tremendous premium over plain-amilia PCs. I wouldn't hold my breath.

"What about multiuser systems and networks?" I asked.

"Fine. But you lose performance. For the individual user, a slower standalone will work faster. Why rush to the 386?"

"Graphics?" I wondered.

"Dream on, Sure, you can do great stuff on these systems, or al test you'll be able to once people come up with standards for takes up huge Instance of Service (1997) and the stakes up huge Instance of Service Aff 1,024 by 1,024 resolution in eight colors, you're stalling a 1-negalyte image per screen, and eight colors isn't much be bring about. I when a 36-expoure roll of color film bolds more information than a 40-negalyte hand when a 50-expoure roll of color film bolds more information than a 40-negalyte hand ski. For CAD-CAM and maybe desktop publishing, okay, For the rest of the world, "Protected-mode multitasking will be

important, though."

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■ STEPHEN MANES

"Sure." Olga snorted. "for the small number of power users who really need it. But data entry clerks and secretaries have enough trouble trying to work with one program at a time. You think hey 'ng going to want to juggle electronic mail and spreadsheets in background mode while they're grappling with their word processors?"

"But everybody says the new programs developed for the 386 machines will be really easy to use. You could have virtually unlimited context-sensitive help."

"Where are these programs going to come from? Say you're developing a new word processor. Are you really going to write one that'll only work on 386 machines and thereby cut yourself off from a market ten times bigger?

"And where are you going to put all this help? On a huge hard disk. Which costs money. So maybe it's not so terrible to have a program whose help system suggests you consult the manual now and then. Besides, the types who see 386 machines as macho fantasies couldn't care less about help screens."

"So what's your scenario for the 386?"

POWER ABUSERS "The 386 machines will sell to power users—insecure managers who can't bear the thought of not having the most powerful unit in the division on their own desks. They'll be dandy for special applications and situations where speed is important. But until they, and all the fats perhipherals they need, get a lot cheaper—which will take a good long while—there work the abig to develop anything but highly specialized soft—years off floundering around until people figure out how to write good stuff for new operating systems anyhow.

"What might—and I emphasize might—eventually sart a 386 revolvation in dazzling program that everybody just has to have but that can I be made to work to have but that can I be made to work to share the second of VisiCule for the Apple or 1-2-3 for the PC. And that doesn't mean an operating system or something like Microsoft Windows. You don't buy a computer to run an operating system or a user interface. You buy it to run applications.

The door to the seminar room opened. The movers and shakers came out looking like Snow White, Tinker Bell, Jiminy Cricket, and Captain Hook.

"See?" said Olga. "Fantasyland!"

Winnie-the-Pooh came over to ask if we had caught his oration about "The Software Honcy Pot."
Olga smiled, "You see that spittoon

over there?"



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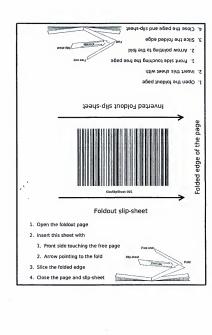
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A HOT, NEW ACRONYM: KLANSS



Amid all the industry focus on local area networks' technical specifications, it's been forgotten that no matter how fast a network runs, it still can't run itself.

K LANSS: An acronym that means "Keep that Local Area Network Simple, Stupid."

Novell and 3Com have been shooting at each other over who's got the fastest network. AT&T wants you to think that setting up a StarLAN is a snap since it uses telephone wiring for connections. IBM has been trying to establish its Token-Ring Network as the standard network system. At least 15 other companies tout their proprictary networking systems as standards. Computers based on the 80386 chip are being touted as excellent file servers for local area networks. Microrim is trying to give Ashton-Tate gas pains by selling its new R:base System V as the only database system that doesn't need special and more-expensive software to run on a network. Oracle Corp., Informix, and Relational Technology are pitching a new concept of widely networkable databases that use the SQL query language from IBM.

Meanwhile, not as many people have bought networks as market researchers would have had you believe just a year or two ago. What went wrong on the way to networked nirvana?

NOT SO HOT As usual, manufacturers have forgotten to consider the poor, dumb user who's got to deal with all this stuff. Indeed, the network manufacturers are acting entirely too much like minicomputer companies when it comes to designing and selline local area networks.

Local area networks wouldn't be a hot item in the PC industry if it weren't for the development of personal computers. Before PCs came on the scene, all of the computing intelligence (meaning processing power, memory, and wideband I/O) resided inside a central computer to which was attached a bunch of screens, appropriately called dumb terminals. This was a fine model for certain kinds of computing, mainly batch- and transaction-oriented data management.

When personal computes arrived, they created a different model of computer model of computer model of computer which interactive, personal applications like financial analysis, personal replications (keeping, and letter and meno writing were appropriate. Annual 1983, local area networks began to be pitched seriously as an idical method for bridging these two models of computing, so that individuals would have access to company database could expute all the data beine created locally.

But most networking companies have been working under the vague assumption



that personal computers can't really be hooked into a system without giving up some of their infernal independence. That means that the network system must be able to keep up with the rest of the corporate system and that basic control of the system must reside centrally, with the information management group or its equivalent. This sort of approach has focused the debate over various approaches to LANs on issues such as speed (4 megabits per second seems to be acceptable), configurations (star, bus, ring, etc.), media (twisted-pair, coaxial, etc.), and protocols (NETBIOS, APPC, LU 6.2, TCP/IP. MAP, TOP, and on and on).

POOR USER Meanwhile, the poor, dumb user has been scratching his head, wondering what all the fuss is about. Nobody explains to this guy that he'd be able to use a laser printer to make great-looking letters because networks can let several people share one of these expensive printers, bringing the cost per user down to an acceptable level. Nobody tells this guy about being able to send a message to all of his coworkers without having to print it out, walk to the copier (which is probably out of toner or has a paper iam), and then stick a copy in everybody's in box. Nobody talks to this guy about being able to read a file from a coworker's hard disk without having to ask for a copy of it on a floppy disk so that he can see what the latest version of next year's budget is or what progress has been made on the business plan for a new business unit. Instead, what everybody talks to this

■ STEWART ALSOP

guy about is whether 4 megabits per second (Token-Ring) is sufficient or whether you need 10 megabits per second (Ethernet). What everybody gets really heated about is whether you have to tear the walls

down to cable your office with Teflonshielded coaxial cable and, if you do, whether a star or ring configuration is best.

If I remember correctly, the basic reason that PCs were so appealing in the first

place was that they were relatively simple, casy-to-understand machines that poor, dumb users could understand and get useful work out of. The very first widely

ful work out of. The very first widely available personal computers ran at a bistering rate of about 1 or 2 MHz, had 40-column screens with all-uppercase characters, and about 16k bytes of memory. And yet hundreds of thousands of people bought these ungainly, primitive machines and found useful things to do with them.

It strikes me that before we can get to the point of using networks that run at 10 megabits per second with 25 computers connected by coustil cable, we need a simple, slow, inexpensive way to connect so so that construct the control of the contro

A few such networks already exist: Easyl. AN from Server Technology in Sunnyvale, California, and MultiLink from The Software Link in Atlanta, Georgia, both connect computers, hard disks, and printers through a serial port and some inexpensive cabling and software. Neither is a speed demon (EasyLAN runs at 19,200 bits per second, while MultiLink Advanced transfers data at 115K bps), but both are easy to use. (They emulate DOS, which most people have unfortunately had to learn.) I particularly favor the approach of TOPS from Centram Systems West in Berkeley, California, which requires a board and Appletalk cabling, but also emulates DOS, runs at 232 kilobits per second, can read files directly off a connected hard disk, and gives you access to Macin-

toshes (should you want such access).

All of these networks can be installed by users; all are simple to operate; all let you share laser printers and hard disks; and all cost less than \$200 per computer.

Once people have figured out how to use these relatively simple, low-performance products, then they'll be ready to graduate to the macho networks everybody else talks about. And they'll be ready to understand the issues from personal experience, instead of being buffaloed by technical errors.



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Bresided Series S. Mr. Jan. And J. A. Apleas

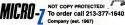
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System Requirements (BM PC, Xf, Af, or compatible, serial part, DOS 2 9 or later and 80 or



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CIRCLE 203 ON READER SERVICE CARD

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 * Appointment book keeps track of your schedule.
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- Notepad lets you jot down quick ideas and memory-joggers you can retrieve at
- Editor creates business letters and spreadsheet reports, and allows you to view and edit existing files.

the touch of a button

- List manager orders daily tasks, and effectively segments/tracks "to do" lists.
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System Requirements.

18th P. S. T. Persable AT, COMPRGP Portable, PLUS, DESCRIPD Two 5-25" double inded this drives (hard-tink recommended for optimal performance). Maximum of 80K required for RAM ensistem portion of ferom. DOS 2 or higher Mercia supported and can be entoyed from

Lotus Metro ruto with a wide variey of software programs, including 12.5° Symphony 7 Symphony Spelling Checker, Symphony Text Outlines, 12.5 Seport Wester," and Signal" THE STUFF DONE





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COVER STORY CHERYL J. GOLDBERG AND GERARD KUNKEL

Charting A Course Through GRAPHICS SOFTWARE

graphics are a powerful,

multidimens/and besiness tool.

A single beautiful graph can illuminate the relationships between numbers, helping you analyze data. It can communicate those relationships to your peers, superiors, or clients. And that same graph will impress viewers with your professionalism.

Good graphics have always performed and will always perform those functions. But, as with everything the control of the control of the have changed the way you can produce graphics. While you once might have spent hours cutting and pasting charts together or relied on production houses or at departments to create the graphics for those charts, you can prow charts youncelf, savine hours and charts youncelf, savine hours and

Business success and graphics go together, and in today's business environment, graphics increasingly means graphics software. For this reason, PC Magazine devotes an entire issue to this subject and helps you chart your way to the PC-based graphics solution most suited to your budget and your needs.

CHARTING A COURSE

dollars in the process. Creating graphics in-house using software will also help you keep sensitive data under wraps.

But beware: just as using word processing software won't make you a better writer, using graphics software won't make you an effective graphics designer. And if you aren't already artistically inclined, you'll find that most graphics software vendors offer few guidelines as to how to use graphics programs to their best effect. At most, the documentation will include a brief discussion of good graphics design, and some packages come with default settings that should keep you from making any hideous blunders. The sidebar "How to Make Your Point with Punch" will give you some tips on how to design graphics effectively. You could also go to a production house or service bureau and ask them to soruce up a rudimentary chart, or even to take your data and create an entire presentation for you. For more information on service bureaus, see "Producing Quality Output: When Only the Best Will Do."

Should you decide to proceed with graphics software, you'll quickly discover that you have a wide array of choices. This special issue of PC Magazine is designed to help you cut through the confusion and zero in on the product that best suits your business application.

MARKET FORCES Graphics software has been available for years. But a lack of hardware standards has until recently slowed its proliferation. The first stab at a graphics standard came 3 years after the introduction of the PC, when IBM introduced its Enhanced Graphics Adapter in September of 1984. Although far from perfect, the EGA can display an acceptable number of colors with a high enough resolution that it can show readable text in one or more colors. The Enhanced Graphics Adapter allows for the display of 16 colors at a resolution of 640 dots by 350 lines (it can also display graphics written for the older Color/Graphics Adapter at that adapter's four-color, 640 dots by 200 lines and 320 dots by 200 lines).

But price was the major roadblock to the EGA's widespread acceptance. When you included the 256K bytes of memory necessary for displaying complicated images rapidly and for scrolling images across the screen smoothly and quickly, the EGA cost nearly \$1,000. It was the September 1985 introduction by Chips and Technologies of its EGA CHIPSet-a set of 4 chips that handles the functions of 19 of IBM's proprietary chips on the EGA-that set the standard on its way to widespread acceptance. By November of that year, more than half-a-dozen companies had introduced EGA-compatible boards based on Chips and Technologies' EGA CHIPSet And these new boards averaged a more affordable \$600. Currently, you can get an EGA compatible for about \$300. For a review of some of these lowcost EGA compatibles, see "The Enhanced Graphics Standard Comes of Age," PC Magazine, Volume 5 Number 14, and "Stretching the Standard: Seven New EGA Boards," PC Magazine, Volume 6 Number 1.

As an example of how widely the standard has been accepted since its intellection, three-quarters of the software packges revised on this issue are EGA compatible. As a result, graphies software is becoming more accessible than ever to the average business user. And the recent amnouncement of 180% raw generation of PCs (due out this year), which will include EGA chip sets fipton to their mothersis, should give graphies packages an even greater boots.

While these changes could well herald an explosion in the graphics marketplace, the market isn't quite there yet. Like other young software markets, graphics software has both shining stars and rough edges—some of which encompass whole products or different parts of the same product. Finding the right product in such a market can be particularly frustrating and confusing.

GRAPHICS SOFTWARE. To help our readers, we've narrowed the field of graphics software covered in this issue for graphics software covered in this issue for general purpose business use. An informal poll of business users revealed that typically use graphic software for three main purposes analyzing and integral numerical data, showing their findings in presentations on a more formal to their poles. The proposed proposed in presentations on a more formal basis to others in their own companies or to

young software markets, graphics software has both shining stars and rough edges—some of which encompass whole products or different parts of the same product.

Like other

HOW TO MAKE YOUR POINT WITH PUNCH

A beautifully designed graphics presentation can help you make your point with punch and make a good impression at the same time. But you should also beware: poorly designed graphics can be downright embarrassing. These tips will help you steer clear of graphics gaffes and make your presenta-

tion as effective as possible. CHOICES OF CHART TYPES

- An area graph is a line graph in which the area under the horizontal line represents a quantity. You can use this type of graph to show elapsed time and the area under the curve to represent cumulative
- Bar graphs show relationships or comparisons between variables. While you may position bars horizontally or vertically, all the bars should be the same width. If used in pairs, the bars should touch and the spacing between each pair should be equal. To distinguish the bars, use different colors, tonal variations, hatchine, or dots.
- Pictographs are used for the same purpose as bar graphs, except that you use symbols from your software's clip art library instead of bars. Each symbol represents a size unit, for example, 10. Rather than doubling the size of the symbol, use two of equal size to show a unit
- Line graphs show the differences between variables. You can use them to show percentage differences between groups, as well as frequency or distribution of a group. They can demonstrate the rank of an item and show magnitude or movement. To differentiate between the groups, use solid, hatched, dotted, or colored lines.
- Pie charts show the way in which various parts make up a whole. The whole is always 100 percent; the pieces represent the percentages made up by the different parts. You might use store, for example, to show the various sources of your profit. The most effective way to arrange the

- pieces of the pie is to place the largest wedge at the top, the other pieces clockwise according to size. The largest slice should have the lightest tone, with each smaller piece becoming progressively darker. The wedges may be named and numbered. For emphasis, separate one slice from the remaining portions.
- slice from the remaining portions.

 Morganizational charts demonstrate positions or rank within an organization. Center each name within a rectangle, with lines connecting each related position. Rank order is indicated from top to bottom or left to right, with equal ranks being on the same level
- Sociograms or nets show how groups interact. You show relationships by using lines. Arrows indicate the direction of interactions. If you wish, you can place numbers above the lines to indicate frequency of interactions.

GRAPHICS LAYOUT POINTERS

- Make sure that your data is completely correct. (You'd be surprised how many times all the percentages don't add
- up to 100.)

 Use as few words as possible.
- Position words so that they read from
- To emphasize a point, use capital letters, bold typeface, italics, underlining, increasing size, color, or texture.
- Use headings to clarify the topic you are addressing with your graphic and make sure that headings are consistent throughout the presentation.
- To make sure your charts are legible, use a simple, clean type style such as Helvetica. Don't crowd the information together or put too much data into one graphic. Instead, break apart the information into concepts that can be quickly and easily grasped, using a different graphic if necessary. Leave lots of white space around text and graphics.
- Consider the distance from which your audience will view the presentation. Do a test run to see whether the size of the material is legible at that distance.

- Text can be centered, or left or right justified. Margins should be consistent throughout the presentation, wherever possible.
- Borders "frame" the presentation.
 You may use solid, heavy black, or colored lines, two or more parallel lines, and tones or textures to fill them in. But re-
- member, when you make borders be sure you use them consistently.

 Colors should be chosen with the document and audience in mind. What might be nice for a neighborhood news.
- might be nice for a neighborhood newsletter wouldn't necessarily work for the CEO of a corporation. Keep the number of colors Jimited on the graphic, and remember that some colors (blue and green, for example) appear "heavier" than others (such as yellow and orange). If possible, arrange heavier colors below lighter ones.
- Composition is what makes a page look good. Good composition involves leaving adequate margins around the artwork. Remember that if the page is bound on the left side, you'll need to allow extra space to make the left and right margins visually equal. Generally speaking, bottom margins should be larger than top ones, especially if you are making a border around the design. You should also use care to ensure that the "visual weight" of the text and graphics looks balanced, with each relating to the other and enhancing the other. If all else fails, look at attractive layouts professionally prepared and model your composition after them.

While these points won't make you a graphics expert, they'll get you going. But before you go, remember the last and Golden Rule of Graphics: "When in doubt, leave it out."—Dlana Goldberg and William McL god

Diana Goldberg, M.A., and William McLeod, Ph.D., are principals of Technologic Ltd., an interior and graphics design firm with offices in Somers and Woodstock. Connecticut. outside clients. All of these uses have one important thing in common: data. We therefore concentrated our efforts (with a few minor exceptions) on graphics software packages that allow you to either key in or import data and graph it. To communicate your findings with others, you naturally need some form of output. Therefore. we selected only those packages that can output to printers, plotters, or film record-

We included only standalone packages; we did not look at utilities that required the use of another package. We excluded products designed for very narrow markets, such as investment software charting packages as well as CAD, paint, and freehand drawing programs. Some of these, such as investment software and CAD packages, will be covered in other roundups. And while you can make effective business graphics with paint and freehand drawing programs, you must actually draw the graphics on your screen with them. As a result, they require a great deal of artistic expertise.

INTEGRATED PACKAGES Analyzing and informally presenting data do not require fancy graphics capabilities. If that's all you need, the graphics of integrated packages such as 1-2-3, Symphony, Framework, and Enable could be all you need. The graphics included in these packages are enough to get a quick feel for the relationship between numbers. Then, once you've made your initial analysis, you can print them out and show them to your coworkers. If you decide to make a formal presentation of your findings, these simple graphs will give you an idea of the best type of graph or chart to use to present your

Within this category of graphics, quality varies considerably from product to product. For instance, while Lotus's 1-2-3 offers the graphics that industry watchers love to hate-with a grand total of five graph types and an awkward output method in which you must save the graph to a .PIC file, then go into a separate Printgraph utility-millions of 1-2-3 users think they're just fine. At the other end of the spectrum, SuperCalc4, with its luscious 64-color palette, offers more-thansuitable graphics. In the review section

GLOSSARY

Bit-mapped A system in which a consistent number of bits defines each individual pixel of display memory. Bitmapped systems are used in applications such as paint programs that address individual pixels-assigning each its place on the screen-and specify pixel colors. The limitation of a bit-mapped system is that storing the address and color information for each pixel that comprises an image requires large files, which take up time it takes to display your screens.

large amounts of memory and slow the Crop To select a portion of an image by cutting away parts from its edges.

Draw program See Object-oriented. Object-oriented (vector graphics) A programming system that keeps track of graphic elements as complete geometric objects, such as circles and rectangles. rather than as individual pixels. Objectoriented systems require less memory than pixel-oriented systems because they store instructions for the placement of entire objects, rather than for the individual pixels comprising the objects. Objectoriented systems are also more flexible because you can perform calculations on the instructions. So you can, for example, easily enlarge or decrease the size of an object using commands. The drawback is that these systems are unable to perform detailed editing of individual

pixels. Paint programs These are bit-mapped systems that offer the flexibility of indi-

that follows, "Graphics Software on Display," we group these integrated packages side by side in alphabetical order by product name for easy comparison.

DEDICATED CHARTING Once you've analyzed your data and decided on a format for presenting it, you'll want to make a presentation that will leave a lasting impression. Dedicated charting programs will accept data, either from the keyboard or by importing it from another package-such as an integrated program-and will create a graphics presenta-

vidual pixel editing and can make use of the maximum color possibilities from the graphics hardware. In most cases, the number and type of colors that a paint program can use are limited only by the number of pixels that your monitor can display. Paint programs are usually easy to use but require some skill if you wish to do precision work.

Palette The number of colors available from the graphics display hardware.

Pan In computer graphics, to move an object from side to side or up and down. Pixel The smallest point that can be displayed on the screen. All screen images, including text and graphics, are made up of combinations of pixels. Pixel is a contraction of "picture element."

Polygon An area defined by three or more connecting line segments. Raster graphics See Bit-mapped.

Resolution The fineness of detail that is shown in a display. Resolution is usually expressed as the number of vertical pixels on your screen times the number of horizontal pixels.

Texture A cross-hatch, speckle, or other pattern that can be used to fill an area in a drawing or diagram. Translate To move a graphic object without rotating it or changing its

size.-Gerard Kunkel and Steve Rosenthal Steve Rosenthal is a free-lance writer

based in Berkeley, California.

tion. Since these programs concentrate on one task, they often offer more features than the integrated packages. Most provide various type fonts in many sizes and weights to help you dress up chart legends and labels. They offer hatching patterns to fill bars and pies in a visually appealing fashion. Some even offer libraries of art that you can copy and use to spruce up your images. The dedicated charting program also has a broader range of output support than the integrated packages. While they can output to dot matrix printers, laser printers, and plotters, most also

CHARTING A COURSE

include the necessary drivers for high-resolution film recorders.

Again, products in these groupings run the gamut of quality and functionality. And price does not necessarily coincide with either. Some packages with roots in the mainframe world, such as Execucom Systems Corp.'s Impressionist, offer nearimpossible interfaces for PC users. Others. with their ease of use and flexibility, herald what we hope will be the shape of all graphics software packages to come. For example, Software Publishing Corp.'s Harvard Presentation Graphics provides extremely easy-to-use, high-quality graphics, though at the price of some flexibility; Lotus's Freelance Plus offers a broad range of abilities-mapping, text and organizational charting, large clip-art libraries, innovative scaling techniques, plus drawing and painting capabilities-all in a single package.

You'll find reviews of these dedicated charting products grouped in three price categories: under \$100, \$100 to \$499, \$500 and over, and arranged alphabetically by product name in the review section that follows

ANIMATED PRESENTATIONS Unlike other applications such as word processors, for which you can use the same old products year after year, successful graphics presentations depend on povelty. To put your best foot forward and keep your audiences involved in your presentation, you might want to add some life to your presentations, literally. "Animated" presentation programs integrate a variety of attention-getting features. Typical features include slide show, animation, sound, paint, and charting programs, as well as a library of prestored images. Some packages, such as Show Partner, can even act as shells that allow you to call up and use other programs without leaving the software.

These animated packages are complete presentation tools. You can show presentations created with such packages in a number of ways; you might display them on a computer screen, direct them to board room video projectors, or transfer them to an image recorder to create a conventional 35mm slide show. For a review of some of these packages, see "Wipes, Pans, and Fade-outs: Animating Your Business Graphics" in this issue.

SPECIALIZED GRAPHICS If you have highly specialized business needs such as for Gantt charts, flowcharts, or organizational charts, a general-purpose presentation or analytical graphics package may not adequately fill the bill. Although this category of products does not necessarily plot data, we included it in our survey of business graphics packages because these products accomplish useful though often neglected tasks for business people. Specialized packages offer these specific features or do a better job of furnishing them than a standard package does. For a review of these, see "Specialized Graphics Software: The Ouick and Clean Solution" in this issue.

PRODUCING QUALITY OUTPUT According to a recent study by 3M in conjunction with the University of Minnesota. using 35mm slides to present your graphics causes viewers to perceive your presentation as more professional. So if you want your presentation to pack the most punch, (and who doesn't) your best choice is to use slides. Once you use one of the packages reviewed here, you can create output in two ways: use your own film recorder or go to a service bureau. If you have sensitive data and/or produce large numbers of slide shows, purchasing your own film recorder or screen camera could be the best option. For a discussion of the features to consider and a look at three new products, see "Producing Quality Output: Three New Film Recorders." If you don't want to go to the trouble or expense of purchasing your own film recorder, you can still use your graphics software to create highquality slides. "Producing Quality Output: The Service Bureau Option" sends you on a whirlwind tour of service bureaus that do everything from putting together slides that you've produced with your graphics software to turning your data into fancy graphics.

This issue is designed to give you a full palette of tools for your business graphics needs. The features tables and reviews that follow should lead you to the precise product that will fill your business graphics needs.

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- Monographics (Hercules Compatible) Card W/Printer Port
- High Resolution TTL Amber Screen Monito
 System Assembled and Diagnostic Tested



The inventors of the 3.5" drive recommend only one floppy disk. Theirs.



If your computer has 3.5" drives, it has a little bit of Sony. Because Sony invented the 3.5" drive technology that has taken floppy disk memory all the way to two megabytes.

So nobody knows better than Sony how important high standards are for producing 3.5" lioppy disks. But then, Sony invented those, too, as well as the most demanding methods for making 3.5" disks.

Such as the Sony Vivax^{nt} magnetic medium, with the high coercive force necessary to suppress the "noise" that can cause disk error. And the Sony DDL^{nt} binder system for incredibly even dispersion of magnetic particles on the disk surface. Then there's Sony's burnishing expertise that eliminates

microscopic projections as small as 1/1,000,000th of a millimeter.

But the best reason to trust only Sony is your irreplaceable data. After 30 your irreplaceable data. After 3

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Marriet or America Sony Vivax, DDL and The One

COVER STORY CHERYL J. GOLDBERG AND GERARD KUNKEL

GRAPHICS SOFTWARE On Display

want to use graphics software to analyze and present data, you'll want to zero in on integrated and dedicated charting packages.

The graphics capabilities of integrated packages such as 1-2-3, Symphony, Framework II, and Enable are designed primarily to help you analyze dain between data. Most of these packages offer only rudimentary graphics, with just a few chart types, colors, fonts, and so forth. Their output is also simple

fare. While all have drivers for printers, plotters, and low-resolution film recorders such as the Polaroid Palette, only SuperCalc4 has drivers for a higherresolution device.

Do you need graphics software to do quick and dirty analysis and to present the results to others? Then you'll want an integrated package with graphics capabilities or a dedicated charting package. We review and chart the features of 44 such packages. More importantly, we tell you what to look for and interpret what those features mean for various types of users.

GRAPHICS SOFTWARE ON DISPLAY

But even though these packages offer only the basics, if you already own one or only need to analyze data, these packages could be all you need.

If you don't have a spreadsheet or need higher-quality graphies than an integrated package can provide, consider a dedicated charting package. Because these package is provide only graphics capabilities, you'll find a wider array of graphics features than in the integrated packages. For instance, most offer several type fonts and hatching patterns to fill the graphics.

These packages also have the drivers necessary to support a wide variety of output devices, including high-resolution film recorders, that will allow you to produce beautiful, high-quality output.

HARDWARE REQUIREMENTS In order to display and produce output with any of these packages, you'll need the proper hardware. About three-quarters of the packages reviewed in this article support the IBME harmoed Graphics Admost displayed to the packages reviewed in this article support the IBME harmoed Graphics Admost displayed to the package fully taken and vantage of the hardware's capabilities, for the most part the number of colors and display.

The higher the resolution, the sharper he image. Resolution is most often measured by the number of lines that make up the image in a raser display on the limage in a raser display on the Lines and 320 dots by 200 lines. The Enhanced Graphics Adapter displays 16 colors at a resolution of 646 by 350. Specialized high-resolution adapters are capable of supporting more colors at higher resolutions.

Hardware and software together determine the number of colors and resolution of graphies output. Most of the packages have drivers for several output devices. In addition, in some cases, you can purchase optional utilities that allow you to output to devices not supported by the package directly. A dot martix color printer ribbon properly and the package of the pa

pens, and produce a corresponding number of colors. If you're interested in learning more, see "Adding a Touch of Color 24 Plotters, 3399 to 55,950," PC Magazine, Volume 4 Number 26. Film recorders can produce anywhere from 200- to 8,000-line resolution and can, theoretically, produce an infinite variety of colors (the practical limit is about half a dozen). Three new liftm recorders are reviewed in

You'll find the listings of the adapters and output devices supported by each product in the PC Magazine fact files that are located next to the reviews of each product.

this issue

OUTPUT You'll want to see for yourself the output you can expect from each package. Therefore, PC Magazine asked each reviewer to create the best-dressed nie chart possible using the package. Special effects used include multiple pies per page, 3-D effects, and the use of clip art to dress up the chart. The reviewers produced the charts using the highest quality/resolution device that the package supports. For many of the integrated packages, this was a plotter. The standard plotter used in testing was the HP 7470A. For packages that used both a Polaroid Palette and a plotter, we chose the output that looked best. Other packages output to dot matrix printers, laser printers, or film recorders. The output device is specified in the captions.

We also include a life-sized detail of a pic chart so that you can see how well the package controls the plotter (or printer if the package controls the plotter) (or printer if support into smooth curves. For instance, you'll notice that Harvard Presentation Graphics controls the plotter extremely well, producing beautifully smooth curves, while isseries are quite noticeable

HELPFUL FEATURES TABLE To help you judge whether the product has all the features you could hope for, PC Magazine has assembled a comprehensive table of features, which you'll find located at the end of this article. The following is an explanation of the features in the table and the importance of each to you

Your primary graphics tools are the var-

on curves produced by GSS-Chart.

Hardware and software together determine the number of colors and the resolution of graphics output. Most of the packages have drivers for several output

devices

ious chart and graph types offered by the program. While all of the products offer the basics; bar, pie, and line charts, you might want to add 3-D effects or remove a slice of the pie chart for emphasis.

Some packages also offer specialized chart types. Scatter charts plot points in which r is the value and v is the cost, with the purpose of finding points that offer the best value for the cost. An area chart is a line graph in which the area under the line represents a cumulative value. If you look at weekly stock trends or anything that varies within a range over a discrete time period, you'll need a high-low chart. Gantt charts look like horizontal bar charts and help you visualize how projects are progressing toward a goal. Organizational charts show the rankings of people within an organizaton.

Having a variety of fill patterns will help you produce visually interesting graphics. And if you're using a monochrome monitor or producing black-andwhite hard copy, the fill patterns will dis-

tinguish different data areas. The ability to manipulate chart legends and labels gives you flexilibity in their placement and length.

With 3-D programs entering the market, a chart can have up to three axes, the third axis being z. The ability to rotate axes is particularly helpful when using 3-D charts because it allows you to position the chart in the way that permits the clearest view of all the data.

Being able to manually adjust the x and v axis is useful when you want to use the graph to make a point. For instance, compressing the x axis will emphasize peaks and valleys, while extending it will smooth them out.

Even if you're not artistically inclined, you can still dress up your graphics with artwork if your package offers a library of images that were created by artists. You can copy images from this library and insert them into your charts and graphs.

Words and numbers are necessary for interpreting charts and graphs. By varying type fonts and using different type sizes for emphasis, you can make your points more clearly. While some packages limit you to just a few font sizes, others provide unlimited numbers of font sizes, "Unlimited" means that you can enlarge or decrease the

size of the fonts in infinite gradations. You may find that putting more than one set of data on the same axis will not fairly represent each set of data. For instance, if earnings increase dramatically, while profits rise relatively slowly, you won't want to plot the two on the same set of axes; the scaling required for earnings will make the different profit levels difficult to distinguish. You may, therefore, wish to create different charts to clearly distinguish each set of data and to place both charts on the same screen for easy comparison. While most manufacturers limit the number of charts per page, others give no limits other than the obvious prac-

tical ones. For business users who are not artists, paint program capabilities may not be important. But such capabilities will allow artists to dress up a chart, adding impact to their presentation.

If you need to support written reports with graphics and you don't want to cut and paste pieces of paper, look for a package that can export graphics to a word processor. If your nackage doesn't have that capability, Inset 2 from the American Programmer's Guild (in Danbury, Connecticut) can. It costs \$99.

MORE IMPORTANT FEATURES One way around limitations resulting from the screen display's size is to create a virtu-

al page, which is larger than what you can see on the screen, in the computer's memory. Accessing the off-screen image is done by panning across the image in memory and redisplaying the new section of the image. It's like looking at a newspaper page through a magnifying glass; you see only a small area of the page enlarged at one time, and so you must either move the page or move the magnifying glass in order to see the rest blown up

User-definable formatting capabilities afford you flexibility. For instance, the labels on a particular chart may be extraordinarily long. A program with only predefined formats might limit the amount of text you can use for the label, resulting in truncated text. On the other hand, by limiting your choices, predefined formats allow you to chart information more quickly. Ideally, therefore, the package should offer both, allowing you to create a chart

EDITOR'S M C H O I C E

Freelance Plus

 Harvard Presentation Graphics SuperCalc4

If you're looking for artistic freedom, consider Lotus's Freelance Plus. The package is so flexible that it lets you control every detail of your image, breaking down even the most complicated graphics into their smallest elements and allowing you to alter each one. Besides creating graphics from data, the package includes freehand drawing capabilities and optional symbol sets. It also supports a wide variety of output devices-printers, plotters, and film recorders—at their highest resolution.

If, on the other hand, you like your graphics quick and easy, yet don't want to skimp on quality. Harvard Presentation Graphics from Software Publishing Corp. is your nackage. Although HPG limits you to five font types and six chart types, including high-low and organizational charts, the package's menus let you create these charts with ease. HPG controls a plotter beautifully. creating exceedingly smooth

curves, and also outputs to a number of film recorders.

Although its graphics are not as extensive as those from many dedicated charting packages, Super-Calc4 provides the best graphics you'll find in an integrated spreadsheet program. The package offers a gorgeous palette that takes good advantage of your adapter card and monitor. It offers an extensive macro language that you can use to automate the process of creating graphs along with an extensive help and intuitive menu system. If you need a spreadsheet program and graphics, you'll find all you need-and more-in SuperCalc4.

quickly if you wish, but affording you the flexibility you need to customize your charts.

Creating a graphics display involves nothing more than carrying out a series of mathematical calculations. Therefore, we looked at whether the packages can use a math coprocessor to speed up the operation of your package, saving you from annoying waits while your package draws or chances an image.

The available resolution and the number of on-screen colors depend largely on the type of graphics board and display, and



Even if you're not artistically inclined, you can dress up your graphics with artwork if your package offers a library of images that were created by artists.

the colors available for output are also device dependent.

The package's data import compatibilities could be a crucial factor in your decision to purchase a graphics package. If you're plaining to use a spreadsheet or database program that you already own, to be a program that you already own, to the stadia into your graphics package, without reformatting. Some packages will alway you to import data, but only if you use a separate utility to perform the data into you to import. The use of such a utility introduces of the package will always the package of the package will be program. The package is the package will be program.

Because graphics programs contain complex algorithms that carry out specific operations for the creation of a graphic image, they tend to be very large. You therefore need to consider the size of the program to make sure your system has enough memory. We've reported the file sizes of both the program and the images it stores.

OUR REVIEWERS

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We obtained these sizes for the total package by running the program SIZE published in "Sizing Up Your Files," Per Magazine, Volume 5 Number 1. The stored image was standard across all the packages tested, and we determined its size by examining its directory listing. We found that some packages took up more than 2 megabytes, requiring the use of a med disk. If you are bedienting a system found that some packages incheduling a system of the control of the control of the line of the control of the control of the line of the control of the control of the line averaging over 2,000 bytes, even a 10-megabyte fixed disk will fill up quite quickly.

While all of these packages support input with a keyboard, not all support a mouse or digitizing tablet. The documenta-

tion and user interface of each of these programs take different forms. We provide data on all of these so that you can choose the programs with the user interface that suits your work style best.

and All and Teatures sale gives you a tool of information. For a more subjective look at what the packages are likely to use, how robust they are, and whether our reviewers would recommend their purchase and for what application, read the indiviual reviews. You'll find them in the section following the features table in four categories: integrated packages, and declerated packages coming under \$100, category, products are listed in alphabetical order by product ame.

GRAPHICS SOFTWARE ON DISPLAY

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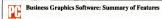
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DEDICATED CHARTING SOFTWARE

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Business Graphics Software: Summary of Features (continued)

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DEDICATED CHARTING SOFTWARE

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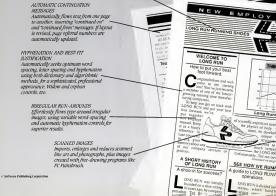
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TOP HONORS



and graphs, braved tests programs. The 1987 so require with a ck off with word processi rint and plot graphs. Quality tests ages in January and project management software in February

ζ	****	8.6	Harvard Presentation Graphics	A 01	J		П	•	256K	\$395	200	-	-	26
	***	-	Chart Master	62				=	192K	\$375	-		-	14
6	***	7.6	GEM Graph	10				=	320K	\$249	-	-	-	18
	***	7.4	Picture Perfect	34	E	-	•	à	384K	\$295	-		П	36
	***	72	Microsoft Chart	20			55		256K	\$295	~	-	-	28

Ratings Ker (On a scale of 0 to CAVERALL EVALUE

* * 60-66 ***** 50

Lots of experts are putting Harvard Presentation Graphics (HPG) at the head of the class. Software Digest gives HPG their highest rating ever for a business graphics package - a rating won for superior performance, combining quality output and fast creation

of graphics. PC Magazine names HPG a "superb choice" because it's "flexible, fast, easy to use and well thoughtout." They rank HPG as a "first-rate graphics package."

Infoworld calls Harvard Presentation Graphics" an elegant and intui-

tive program," that is also "powerful and versatile." And, according to PC Week, "the real key to a presentation graphics package is output, and this is where

HPG really shines." To get top honors for your

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GRAPHICS SOFTWARE ON DISPLAY: Integrated Software

•

Enable

Module for module, integrated programs generally offer fewer features than their standalone counterparts. Enable's graphics module is a notable exception to this rule: despite some limitations, it has enough capability for most purposes. And, while the graphics alone don't justify the 5695 price. The Software Group's Enable makes are as whose could be worth it.

PERMISSION REQUESTED By any measure. Enable is easy to use. Installation is fully automated the program asks a few questions about equipment then prompts you to put in disks as needed. Even better, the installation program amounces what it's doing at each step. It even stops and asks permission when appropriate—a boom for sophisticated users who resent installation routines that mess anunal with their hard disks.

Enable's well-thought-out menus also help keep things simple. With few exceptions, the Lotus-like, one-word menu choices are constructed logically, making it easy for even a newcomer to get around. To change twopfaces, for example, simply choose Options, Global, and Fonts.

Separation of Louis users of 1-2 will be speaking of Louis users of 1-2 will be Speaking of Louis users of 1-2 will be Speaking of Louis users of 1-2 will be a Louis be particularly interesting. The Endoles speakshest imports 1-2-2 like particularly interesting. The Endoles speakshest imports 1-2-2 like particularly interesting the Louis Louis beautiful and comport affacts flies into its database module and create graphs from the database module and create graphs from the database. Version 1-10 Enablet—the-sist interesting the Louis L

As part of an integrated package, Enable's graphics module has several special

features. Although you can't display two graphs in the same window on-screen, you can use several windows to display as many as four graphs simultaneously. Also, while you cannot print more than one you can copy multiple graphics to a word processing document to print several graphs on the same page (though not side by side). And, once the graphs are transferred to the word processing module, you can write text on top of them. Emble's clasgraphics, too.

Among Enable's niftier graphics features are its 3-D bar charts, both stacked and standard. Though confined to using the x and v axes, the bars themselves are

Enable offers some uffre graphics features, such as 3-D bar charts. It can output to printers, plotters (used here), and the Polaroid Palette image recorder. Unfortunately, Enable has some notable limitations. Pie charts, for instance, allow a maximum of ten

letters for labeling each slide. This truncutes "Manufacturing" in "Manufacturing" or "Real Estate" to "Real Estate" to "Real Estat." If you need perfect labels, you can, however, transfer the graphics to the word processing module and write text

Enable

62.87. Manufactur

4.87. Equipment

12.07 Publishing



13.0% Real Estat

drawn in three dimensions. When you add a vertical and horizontal background grid, you have a much more interesting graph than the usual boring bar chart.

If you're interested in creating true 3-D graphs—using the x, y, and z axes—you should note that Version 2 of Enable will include Perspective (Three D Graphics, Pacific Palisados, California), a software package that generates true 3-D charts, as an integrated part of the graphics module. As with the standard graphics module, usres will be able to graph databases and spreadsheets with Perspective. At the time of this writing, however, The Software



With few exceptions, Enable's one-word menu choices are constructed logically, making it easy for even a newcomer.

to get around.

Group expected that Perspective graphics would not be transferable to word processing documents.

Unfortunately, Enable has some notable limitations. Pie charts, for instance, allow a maximum of ten letters for labeling each slice. This truncates "Manufacturing" to "Manufactur" or "Real Estate" to "Real Estat". The program also has a shortsighted approach to error recovery. In all of the tests for reading or writing a file with open disk drive doors, unformatted disks, and full disks, Enable caught the error and gave the option to retry or abort. If you choose retry. Enable does as it was told originally, and nothing is lost. But if you choose abort, Enable dumps you to DOS rather than taking you back to the program. That's not reasonable when you're trying to save a file to a full disk.

Enable's documentation, though good, has room for improvement. The package's spreadsheet and graphics manual provides a good introduction to the program's capabilities, with most of the details explained, but 1 ran into at least one problem for which I could not find an explanation. Fortunately, The Software Group's welltrained technical support staff usually could give me an answer almost immedi-

It's misleading to focus on Enable's graphics module alone; the package targets mainly those who want graphics as one feature among many. Still. Enable's ability to graph files from 1-2-3, dBASE, and elsewhere could make it an attractive supplementary program, particularly if you're loyal to one of these standalone programs but still need Enable's better graphics or its integrated structure. Though limited in some ways, the graphics far surpass those of most spreadsheets; with the addition of Perspective they will become better still. On almost every item, from ease of use to quality of documentation to vendor support, this package has a lot going for it. -M. David Stone

Framework II

Reviewing an integrated program like Ashon-Tate's Famework II as a graphics package is a little like evaluating a BML as a steroo system. It has the requisite features to get the testing started, but it cannot stand up against the professional competition. On the other hand, Framework II is own the considering as long as graphics are not your major need, in much the same way as a BMU can be a good stereo system if you simply want to listen to music as you get from here to there.

pie charts from data in a spreadsheet. You can put in a title, label the axes, and control the size of the graph. You can even specify the print attributes for the text of the grapt Framework IF is installation program offers support for a wide range of printers, including the HP Laserjet. You can also specify a plotter, a few different ones are listed.

Framework II will create bar, line, and

Data import is perhaps the strongest feature of the program. Framework II could import almost every format included in our test procedures. It imported the AS-CII text file but could not put it in a spreadsteet. The #BASE. DIF. and 1-2-3 worksheet formats went without a hitch. One of Framework II's slickest details was the way it automatically adjusted the individual column widths on the spreadsheet after the data had been imported, resulting in a custom design that was as efficient as if I had designed it manually.

Despite that good news, Framework II will severely limit you once you start to design your graphs. For example, only one title line per graph is permitted. If you add no title. Framework II uses the frame label as the title. You can create a different title by either editing the frame label or modifying a formula associated with the frame. Framework II uses an unintuitive approach to set some specifications for the contents of frames; it puts hidden FRED formulas in the "borders" of the individual frames. (FRED is the Framework II programming language, similar to the Lotus macro language and the dBASE programming commands.) Graphs are defined through the (a DrawGraph function, which accepts a seemingly endless string of parameters, one of which is the graph title. When you try to put a carriage return in the middle of



Framework II, Version 1.1 Ashton-Tate 20101 Hamilton Ave. Torrance, CA 90502-1319 (213) 329-8000

1319 (213) 329-8000 List Price: \$695 Requires: 384K RAM; two disk drives or hard disk; DOS 2.0 or later. Supports: IBM Monochrome Adapter, CGA, and EGA; Hercules mono-

CGA, and EGA: Hercules monochromolyraphics card. Hercules UltraPuk; AST Monograph Plus card. Fersyst Emulex BOB display adapter; STB Graphix Plus II board; Paradise display adapter; Sigma display adapter. Do matrix, ink jet, and laser printers; plotters.

In Short: One of the best-known integrated packages, Framework II has only limited capabilities to produce graphs from spreadsheet data, sufficient only for incidental use in documents. If you want graphs from Framework II that can stand on their own, plan on buying a standalone graphics program. Not copy protected.

CIRCLE 665 ON READER SERVICE CARD

Framework II: Pie Chart





Framework II's graphics are severely limited. You get just the basics in a pie chart: no segment labels, one tile line. . . . Also, the output shown here is actual size; we were unable to create a larger one. Because of the program's difficulties handling a ploter, this sample was created using an HP Laserier Plus.

the formula, though, all you get is an error message. As a result, you're stuck with a single line for a title.

The @DrawGraph function was the source of a number of difficulties during our tests, especially when I tried to explode a pie segment. Framework II lets you explode one or all pie segments by using the last parameter. The manual shows that, unlike bar charts, which take up to nine parameters for this function, pie charts take up to ten parameters. When I tried to explode the segment, a syntax error occurred. So I then made the last parameter the ninth-only to be informed by the program that on pie charts, a maximum of seven parameters are accepted. With erroneous documentation and an obscure method of control, it's a wonder that Framework II users manage to explode their pies before their tempers explode.

PLOTTING PROBLEMS The draftquality graphs produced by the IBM Proprinter were quite rough, so I looked forward to seeing the plotted output, Luckily, I had noticed a few important details in the Install program. First, the Telecommunications module works only with a modern attached to COMI (the first serial port). You can run a plotter off COM1, but then you may have to give up communications. To make matters worse, Framework II gives you no way to control the COM1 configuration; you are advised to use the DOS MODE command before you load Framework II-not a big deal but more technical than most users need to get for most programs.

When I plotted my graphs with the HP 7470A, the results were disappointing, to say the least. Framework II printed the title with such large letters that only the first two-thirds of the characters fit on the page.

The bars that were nicely shaded in the dot matrix printouts were simply left open on the plots; your only clue as to which bar was which was the color of its outline, and at first glance blue and black are not easily

distinguished.

Framework II's pic charts were the downfall of the program's plotting performance. The plotting performance. The plotting performance. The plotting performance is a second performance in the plotting performance in the p

coxt. To give the program a chance to print something of quality, I used an HP Laser-jer Plus. Unfortnately, Framework II still serjet, and it insisted that I did not have enough memory to print the graphs in 300-dot-per-inch mode. I had to settle for 150 did, which resulted in some clear and presentable charts even though text was rather grainly.

Since Framework II uses finnes to organize its elements, the program makes it easy to assemble multiple images for printing at one time. Unfortunately, you can print them only one after another in a vertical arrangement on the page, but I was able to fit four on a page with ease. Including angih in the midst of a text report is glust as easy to do. Framework II also has a very convenient estimates that lines you like a work of the control of the contro

Overall, the Framework II package gets

low marks for its graphics program's flexibility and control features. The design quality of the graphs themselves is only fair, and the pie charts are difficult to decipher without labeled segments. If you're already using the integrated package for its other capabilities and are looking for a way to produce great graphs, plan on buying a standalone graphics package that will work well with the data Framework II puts out—Affect People.

Javelin

ATVELLIA TO A STATE OF THE ATTENT OF THE ATT

Javelin's approach to handling information may well be unique. It lets you enter data in any of several formats, including a table of values, an algebraic formula, and a columnar worksheet (similar to a spreadsheet). Each of these formats is called a "view." Once you've entered and identified your data in one view, you can



Javelin Software Corp. One Kendall Sq. Cambridge, MA 02139 (617) 494-1400 List Price: \$199.95 Requires: 512K RAM; two disk drives; DOS 2.0

Supports: IBM Monochrome Adapter, CGA, and EGA; Hercules monochrome/graphics card. Dot matrix, ink jet, and laser printers; plotters.

In Short: Jarelin is a business-analysis tool, and its graphics said distraint, diety are finited to basics but are easy to create and easy to modify. Not copy protected.

Officer and other constructed CARO.

or later.

GRAPHICS SOFTWARE ON DISPLAY: Integrated Software

manipulate and examine it easily in any other format.

For example, let's say you enter the equation. Profits = Income - Expenses. using the formula view. Then you use the worksheet view to create two columns, one for income and one for expenses, with each row labeled as a different year. Once you've filled in numbers for income and expenses, you can next go to the table view to see a table of income, a table of expenses, or a table of profits. Or, you can go back to the worksheet, add a new column for profits, and immediately see the numbers. You can even create a new worksheet, label the rows with a random choice of years, label a column as profits, and see profits for selected years.

Jarvilir also makes things easy when you receive a graph. Once you've entered the data in the Jarvelin model, you need only select Deline Graph from the one-line menu, and Jarvelin will present you with a graphics option serven. This simple, fill-serven variables and sarppites labels for each on the graph. This serven also asks you to select your format; you can choose me, but stacked they prevent good to the prevent good the good to the good

GRACEFUL RECOVERY On our tests for robustness, *Javelin* recovered reasonably well from orders to read or write a file with open disk drive doors, unformatted disks, and full disks. In one case, Jarethin informed me it was unable to load a file because of "Unknown DOS Error 18" (the disk drive door was open). Most other messages were more informative than this, however, and in every case I needed only to hit Esc to recover. Recovery was simi-



Using Javelin is exceedingly simple, thanks to a thoroughly thought-out program design. This thoroughness extends to the tutorials as

well.

larly graceful when I ordered the program to print to an off-line or powered-down printer.

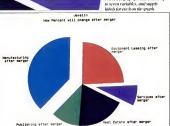
As this description suggests, using Jarelin is exceedingly simple, thanks to a thoroughly thought-out program design, This thoroughness extends to the tutorials as well. The Guide to Learning Javelin explicitly recognizes that different people learn in different ways and offers two possible methods. If you like to work from examples in a book while using the actual program, Javelin supplies a hands-on written introduction. Alternatively, if you prefer using on-screen tutorials, Javelin gives you those, too. With the first approach, you can experiment while learning; with the second, you can't confuse yourself by making a mistake. I tried both sets of tutorials and found that each gave a good introduction.

duction.

Javelin's documentation seems to be well written and thorough, but I found one oversight. A Javelin Software Copr. representative said that the program could import comma-delimited ASCII files into a Javelin worksheet, with each comma-delimited that the program could imited number going into its own cell. I tested this feature and it works fine—but it's not mentioned in the import section of



Javelin offers a lumined number of graph types, including line, burstocked bur, percentage burhorizonatal bur, jei, cand x-y jala. Javelin coupats to printers und polners (tased here). But Javelin makes it casy to create og graph. Our you've cuttered your data, you make a single selection from a constitute und to get into the single. [Il-in-the-bloads, farm lets wangle, [Il-in-the-bloads, farm lets



the manual. I can't get too upset about extra features in a program, but if they aren't mentioned, they aren't much help.

Because its flexible data-handling scheme lets you jok and choose from information entered into your model. Javelin makes i relatively easy to create a number of graphs from one set of data. Its graphies section, however, offers nothing fancier than straightforward charts. If you re look, in graphies, you can find programs that cost less and do more. But if you're looking for a business to off that uses you relooking for a business to off that uses the cost of the cost

MathPlan

MantPlan, Version 3.0, is a new release into the spreadsheet/graphics market WondPerfect Copp., originator of the Welknown word processing program of the kelknown word processing program of the same name, is marketing MantPlan as a powerful spreadsheet designed to compete with Lours's 1-2-3, and it does that quite well. The product has obviously been carefully thought on and implemented, and it has the potential to become a major spread-sheet application.

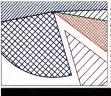
Yet as with 1-2-3 and other spreadsheet packages, it is extremely unlikely that anyone will buy MathPlan just for the built-in graphics. However, considering that the main thrust of the product is its spreadsheet, the graphics functions are quite impressive.

Installing MathFlan is straightforward, even though six disks are required to support all the spreadsheet, printer driver, and graphing functions. A non internuted more and arguing functions. A non internuted in the been designed to help you to begin to see the been designed to help you to begin to see the formalist with the basic spreadsheet commands before using the graphics is probably a good diese. Surphissing by, though, it's not absolutely necessary. If you are familiar with the armount of the property of the prope

enough of some similarities to 1-2-3 to be conventional. Also, some very good online help is available to help you out of most jams.

Creating and modifying a graph with MathPlan is an extremely simple task. With the spreadsheet data on-screen, you type Crd-F9 to define your graph type (1 = pie, 2 = bar, and so on). Then hit Alt-F9 to define the blocks of data you want to graph. When you finish, your eranb is raidfully drawn.

Although the product is preset to define data in a specified row or column orientation, you can reverse that order when you specify the graph type. So it isn't necessary to rearrange your spreadsheet if it is in the wrone order for the graph type in the wrone order for the graph type.



The pic chart below was output using the Polarid Pelatei mage recorder. MultiPlan can also create output with printers and plotters. Creating and modifying a graph with MultiPlan is easy. With the spreadsheet data on-screen, you type Cit-Pl to define your graph yee, then hit Air-Ps on your pec Cit-Ps to define your graph yee, then hit Air-Ps define the blocks of data you want so graph. You graph is regular to graph poin mean at the bostom of the graph with numerous choices, such as moving elements or





GRAPHICS SOFTWARE ON DISPLAY, Integrated Software

have specified. This is convenient.

Once your graph is on-screen, Main-Plan displays a graph option menu at the bottom of the graph, with option of changing the graph aspects, moving elements, adding amers from the worksheet to the x-axis, adding worksheet names for the legend, outputing to the specified device (primer or disk), and windowing to change the size. Within each of the menu options are numerous other choices, detending on the display used.

With an EGA display and card, you can specify up to 16 colors and different fonts and font heights, change fill patterns, ro-



MathPlan supports GSS drivers and is unique in that it will run almost any screen driver, including those without graphics capabilities.

tate text, change the graph orientation, explode pie slices, and control many other aspects of appearance. The overall range of control is excellent, particularly when you consider that this is really not the main focus of the program.

You can change graph sizes in two ways, First, the window function lets you specify the size of the screen (or output) that the graph will coopy. You can draw a window easily by creating and stretching a bow with the curbo keys. Second, you can move the displayed graphs to screen quadmats with the arrow keys. Second, you can move the displayed graphs to screen quadtured to the street of the screen of the analysis of the screen of the screen of the allows graphs to be saved in a smaller for must that can be easily integrated into a word processing document—in WordPerfect forms, of control of the screen of the screen for forms, of control of the screen of the screen for forms, of control of the screen of the screen for forms, of control of the screen of the screen for forms, of control of the screen of the screen for forms, of control of the screen of the screen for forms, of control of the screen of the screen for forms, of control of the screen of the screen for forms, of control of the screen of the screen for forms of control of the screen of the screen of the screen for the screen of the screen of the screen of the screen for the screen of the screen of the screen of the screen for the screen of the screen of the screen of the screen for the screen of the screen of the screen of the screen for the screen of the screen of the screen of the screen for the screen of the screen of the screen of the screen for the screen of the screen of the screen of the screen of the screen for the screen of the screen of the screen of the screen of the screen for the screen of the screen of the screen of the screen of the screen screen of the screen screen of the screen of the

A COUPLE OF QUIRKS While the graphics functions in MathPlan work quite well, a few minor quirks, most of which can probably be ascribed to the fact that Version 3.0 is a brand-new major update, can be botherome. For example, while you can change spreadbler data and have you can change spreadbler data and have back to the graph with a single keystroke. You need to press AIL-F9 again (for defining blocks), and then a few carriage returns, since MathFlan remembers the blocks you have previously defined. This method does give you the option of change in a block before redisplaying the graph, long a block before redisplaying the graph, long the properties of the properties of the graph itself quite as easily as you can in some other provisions.

Also, when you change the size of the graph by windowing, certain elements—pie slice names, for example—don't automatically adjust, and so you may have to move each one manually. You can get around this drawback by sizing the picture first and then adding the names, but again, it's less convenient.

Otherwise, MathPlan is a pleasure to work with. The file import/export facility is a breeze to use. It accommodates 1-2-3 files, DIF, and aBASE IIIII files, among others. Import/export of files is accomplished from within MathPlan, so you don't need to exit the program to handle the task.

MathPlan supports GSS drivers and is unique in that it will run almost any screen driver, including those without graphics capabilities (it will generate text-oriented graphics). The better your graphics system, the better MathPlan looks (and it looks just fine with either CGA or EGA combinations).

Besides the wide range of drivers included with the program, a wide range of other drivers are available from WordPerfeer for a very nominal SS handling charge. These drivers include those for such exotic display devices as the Bell & Howelt Quintar series, the Intecolor 2427, and camera devices including the Calcomp, Magi Silide, and Polaroid Palette.

As with other WordPerfect products, the telephone support is exemplary. The call isn't free, but the help is, and support personnel are informed, patient, and courteous.

The graphics in MathPlan are fine for beginning and intermediate users, although they obviously lack some of the re-

finements of dedicated graphics packages. Without question, though, you can create some very attractive screens and output with MathPlan. When combined with the excellent spreadsheet component, MathPlan is a superior software product.

-Jon Pepper

1-2-3

Graphs and 1-2-3 from Louis Development Cop. were made to go hand in hand. The purpose of making a graph is to prasent your data in a visually appealing manner and to show your audience the subtle similarities, or phe outstanding differmight otherwise go unnoticed. You can easily fulfill these expressive desires using 1-2-3, and the program less you go from a worksheet to a graph in seconds. The level of sophistication is questionable, though 2-2-3 limits you to just five y types of

The most convenient aspect of creating graphs with 12-31 is that since you're must likely using data 12-33 created, you don't have to worry much about altering formats. And a sparate utility is available to translate to and from dBASE IIIII, DIF, and Visit Cale files. Once translated, however, some files might need to be reordered to fit the 12-35 format.

1-2-3 builds graphs from the ground up.





one disk drive; DOS 2.0 or later. Supports: IBM Monochrome Adapter, CGA, and EGA; Hercules monochrome graphics card: Tecmur Color Master Adapter. Dot matrix, ink jet, and laser printers; plotters.

In Short: A fully integrated package with spreadsheet, database, and graphics that allows you to easily create and print simple graphs. Copy protected. GRICE 663 ON PRADER SERVICE CARD



GRAPHICS SOFTWARE ON DISPLAY: Integrated Software

The figures your chart will use are not entered as separate data points but rather as a range of data. As your data is already in a two-dimensional rows/column format, reading the ranges into the graph is a simple task. First, select the type of graph you prefer: line, bar, x-v, stacked bar, or pie.

The next step is to enter data. 1-2-3 recognizes up to six ranges for comparative data (except for bar charts, which can use only one range). As soon as you have entered the data, you may immediately display the graph. If you change any of the



Since 1-2-3 draws a graph, in conjunction spreadsheet, you can save the graph settings along companion

numbers in the data ranges, the graph will reflect the change the next time it is viewed. The chart at this point shows only the information entered and a numerical scaling on the vaxis.

The options menu allows you to complete the graph. You can use it to insert a main title and a subtitle across the top of the chart and to label both axes. Legends for all six data ranges can also be added at the bottom of the graph to identify the symbol, color, or cross-hatching assigned to each range. Other options include horizontal and vertical grid overlays, lines and/or symbols for line and x-y graphs, and y- and x-axis scaling. You can display your graph in color with a color monitor, or if you save your graph with color settings, it will be assigned colors when plotted. Press F10 or select View to display the chart at any stage of its development.

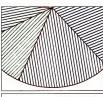
Since 1-2-3 draws a graph in conjunction with a spreadsheet, you can save the graph settings along with the companion spreadsheet. Simply by giving each chart a different name, you can save more than one graph with each spreadsheet. You can then recall and alter each graph individually. If you intend to print the graph, you'll need to use a separate save command and out all the settings into a .PIC file.

You execute all graph printing and plotting from outside 1-2-3, entering the printgraph utility from DOS or through the 1-2-3 main menu. Printer and plotter setup occurs during the initial 1-2-3 installation; if you want to change the settings, you must go back and use the install utility again.

POINT-AND-SHOOT MENUS Familiar point-and-shoot menus guide vou through the printgraph session. Select an

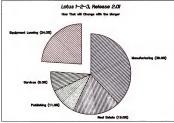
image or more than one (1-2-3 will print graphs sequentially), and choose the size that you want the output to be. Eleven font choices are available, but you can use only two in each graph. If you saved the .PIC file with color settings, you can select colors for each range. limited to the colors offered by your hardware. From then on, you issue the standard 1-2-3 print commands: Align and Go.

1-2-3 offers two types of tutorials, an on-disk version and a written one. The disk tutorial, "A View of 1-2-3," is not much more than a quick tour through the entire program; graphs get very little treatment. The easy-to-understand written tutorial, though, will help you build simple graphs. The reference manual is most helpful; it's



Lotus's 1-2-3 graphics are convenient to use. Since you're most likely using dutu 1-2-3 creuted, you don't have to worry mach about alterius formats. You can gu from wurksheet to graph in seconds. The level of sophistication is questionable though: 1-2-3 limits you to just five types of graphs. Lotus outputs to printers and plotters (used here). Since 1-2-3 draws u graph in conjunction with a spreudsheet, you can save the graph settings

ulong with the spreudsheet.



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ACTUAL SCREEN showing all 12 months and the totals column of a Lotus spread sheet at one time. Note the sharpness of the 8 x 14 character cell produced by



well written and easily understood, explaining all the graph and printgraph commands clearly and logically.

Depending on your hardware, the visual output from 1-2-3 can be quite impressive. What's more, the entire process is not very difficult. If you own a copy of 1-2-3, give it a try. You may be able to get moreelaborate graphs from a standalone graphics package, but why buy something else when 1-2-3 will do?-Christopher Barr

SuperCalc4

SaperCalc4, from Computer Associates International, is an integrated spreadsheet program that allows you to assemble, analyze, and calculate numeric data. Its graphics capabilites, while not as extensive as those of some programs devoted solely to graphics, are more than adequate for most business needs

SuperCalc4 has a gorgeous palette, with easy control for choosing graph component colors. Depending on your graphics adapter card and type of color monitor. you'll see 4 or 16 different colors on your monitor. With the fanciest configuration-an EGA monitor in high-resolution mode with an EGA adapter-you see the 16 colors but can change the red, green,

FACT FILE SuperCalc4, Version 1.0 Computer Associates International Inc. 2195 Fortune Dr. San Jose, CA 95131 (408) 942-1727 List Price: \$495 Requires: 256K RAM: two disk drives or hard disk: DOS 2.0 or later for a PC or XT: DOS 3 O or later for up AT ports: IBM Monochrome Adapter, CGA, and EGA; Hercules monochrome/graphics card. Dot matrix, ink iet. and laser printers; plotters. Polaroid Palette image recorder; Video Show 160 esentation system In Short: SuperCalc4 is a user-oriented spreadsheet program with all the power of 1-2-3: it also creates great graphs. Not copy PICLE 169 ON REACHER SERVICE CARE

and blue values of each of the colors to customize your own palette.

All data for graphs in SuperCalc4 is held in a SaperCalc4 spreadsheet. You can either type that data into the spreadsheet or import it from other programs. Super-Calc4 can input data files from 1-2-3 Release 1A and 2 (WKS and WK1). DIF. SYLK, and ASCII text and comma-delimited files as well as other formats. You don't have to leave SuperCalc4 to import data files-a real convenience. And SuperCalc4's data management function allows you to sort, select, or extract desired data items for display.

SuperCalc4 displays data in familiar spreadsheet columns and rows. You use the program's menus to choose up to ten

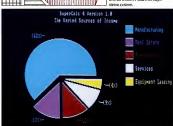
data groups for display, view different graph types, save the graph as a part of the spreadsheet file, and print it. If you want to change your data, all you have to do is to go back to the spreadsheet, make the change, and then immediately display the

graph again.

Graphs are not saved independently of spreadsheets. Each sheet can have up to nine graphs associated with it. To call up a graph that you've already created, you load first the spreadsheet file and then the desired attached graph. If you need more than nine graphs for a set of data, you can clone the spreadsheet: you copy the sheet. give it a new name, and then design anoth-

er nine graphs. Although SaperCalc4 cannot produce

SuperCalc4 has a paregous palette, with easy control for choosing graph component colors. The package also has a good variety of chart and graph types for an integrated package, including bar, stacked bar, pie, pie with removable slices, line, scatter, area, and high-low. SuperCalc4 outputs to printers, plotters (used here), the Polaroid Palette image recorder and the VideoShow 160 presentation system. The package offers an impressive help system and an intuitive and thorough





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multiple charts on a screen, it can print multiple graphs on the same page of paper. To do so, you must specify page size, horizontal and vertical offsets, rotation, and the quadrant of the page in which you want the graph to appear.

ALTOMATIC ALTOMATION Super-Coled also allows you to automate the whole process of creating graphs with is: the whole process of creating graphs was temand ensure accuracy, you can build marcot functions. Super-Calcd's macro language also includes macros that create menus to customize applications. For example, you could automate graphics parameters to handle varying data sets. In addition, Japer-Cald' goes as they forther and automates "learn" feature that can watch your keystrokes and turn then jino a macro.

strokes and turn them into a macro.

An example of how convenient the macros can be is the process of preparing a monthly profit-and-loss report. If you store financial data each month in the same spreadsheet or a template of it, you could use a graphics macro to allocate data sets, set titles and labels, and customize the graph. Then you'd simply save, print, and display the new graph.

SuperCalc4's help system is impressive. From installation to help files to such on-the-go features as listing available files and graphs. SuperCalc4 consistently provides information and offers techniques that save time and make the program considerable power available to a reasonably adroit user. One example is the file listing routine, which displays a filename, comment, creation date, file size, and the name and type of all attached graphs.

Supercated installs itself. Whenever you run the program, it looks for video boards, 8087 chips, and the amount of memory available. The program then adapts itself to the system on which it's running. While you can also modify the program at any time to optimize for size of the spreadsheet or speed, you'll probably stick with the default settings most of the time.

An intuitive and thorough menu system leads you through the program's functions. SuperCalc4 uses a horizontal menu structure with explanation and option lines below. As you issue commands, the program records the sequence of commands on the screen so that you can retrace your

steps.

The SuperColc4 manual is all in one volume, which also includes two quick-reference cards (one for spreadsheet commands and functions and the other for graphics) and two keyboard templates. A short storial will get you up and running quickly, In addition, the munual includes a 144-page tutorial, of which 27 pages are devoted to erarbics.

As an added feature, SuperCale4 includes Sideways, a utility program for printing in rotated, landscape mode. Also, SuperCale4 is relatively robust. Whenever 1 tried to fool the program—for example, by reading or writing from or to an unformatted disk—it gave me an error message, then came ripth back.

SuperCale4 is a splendid graphics program that does much more. If you don'tal-ready have a spreadsheet program and ened graphics, you may find all you need—and more—in SuperCale4. A highly functional spreadsheet program that competes toe-to-toe with 1-2-3, it produces attractive screen and printed graphics.—Bruce Brucem

Symphony Symphony, from Lotus Development

Corp., is one of the best-known integrated programs around. With it, you can create graphs using the same program you use for spreadsheets, word processing, database management, and communications. Unfortunately, the graphics, while presentable, aren't astonshing, and they have a number of limitations. At a price of \$605, \$mphony is creatinjy worth considering for its capabilities as an integrated package, but not for its graphics alone.

The Symphony graphics module works almost exactly like 1-2-3 vs, our aquickly create bar, line, and pic charts from your spreadsheets or your database records. If you have two monitors, you can view the graph on one while editing the data on the other. The graph is not updated automatically when you change the data, however; you must redraw it to see the effects of any changes.

Though Symphony's graphics module

doesn't burst with features, it offers a few options for improving your presentation. You can add titles, control the scale, control the scale of the axes, specify the colors or haching patterns used for fill elements of the graph, and choose the final size of the image on the paper, You can also select from Il offer-paper, You produced to the paper of the You profined is capital of graphics output, the chances are fairly good that Symphony will work with it.

THE PRINTGRAPH PROBLEM Unfortunately, the program also shares an important drawback of 1-2-3's graphics segment. Like the other Lotus package. Symphony creates and prints graphs using two entirely separate modules. This means that you must leave the worksheet-oriented Symphony module and enter the Print-Graph module every time you want to make a hard copy chart. Before exiting the spreadsheet portion, you must set up your graph, then save it as a .PIC file. After that you call up the image with PrintGraph, adjust size, fonts, colors, and other details, and print it on your printer or plotter. (You must have already installed the appropriate



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drivers with the separate Install module, but since this permits multiple drivers, you can load up all the drivers you might want so that you won't get caught short later on.

You can also add new drivers with Install.)
One major implication of these separate
functions is that you cannot print a graph as
part of your spreadsheet or word processing document. Instead, each graph must be
printed on a separate page—unless you
want to leave space for it and then cut and
passe by hand or feed the paper through the
printer twice.

These drawbacks wouldn't be all that hard to live with if the graph quality were better. But Symphony imposes severe limitations on the amount of text and its placement on the graph. The fonts are acceptant

able, but nothing to write home about (or with). Compared with dedicated graphing programs, this program has serious design restrictions: no second y-axis scale, no area graphs, only one graph to a page (although you can batch-print graphs), limited hatching patterns, and rigid placement of the graph element.

Unfortunately, what features it does hading or exploded segments on a pie chart, for example, you must set up a separate column of data on your spreadskeet to control these features. The graphics module's documentation is spread rather thin, making it tough to find what you want sometimes. To too it all off. Symuhorw is coov

protected, although you can install it on a

Symphony offers a number of

hard disk so it'll load without a key disk.

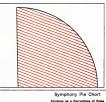
If you need an integrated package, you might consider Symphony. But if you're only looking for a way to get good-looking graphs, buy one of the standalone graphics packages.—Alfred Poor

Twin Classic

. .

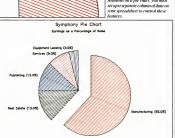
Users of 1.2-3 know about the drawback of its graphics module—jou can relate only five types of charts, for example, and to just meet the post of the property of the property

The first noticeable difference between the two is the number of graph types available. With 1,23 you may build five different graphs. Two flasts of allows eight line, x-y, horizontal bur (stacked or clustered), vertical bur (stacked or clustered). 3-D bur (clustered only), pie, 3-D pie, and pie-bar combination. To build the graphs, you enter your data directly from the work-best, 1,23-3 yells. P vinu (Cluster), 2,23 only six, After assessing the data ranges, 1,23 only six, After assessing the data



options for improving your preventation. In our oud ditties, specify the evlars or hatching patterns, choose the final size of the image on the paper, and select from 11 different type fants.

Symphony supports plotters fused there in and the PL baselp printers as oniput devices. Unfortunately, the features it has are often difficult to task. To get shading or exploded segments on a pick chart, you must set up a separate column of data on your spreadsheet in crutical these.





could put off some users. Not copy protected.

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ALL PARTS COMPLY WITH FCC STANDARDS CLASS B. ranges, you handle most of the customization through the options menu, with a three-page pop-up screen acting as a blank input form.

Almost all of the graph options are entered manually. The first menu offering is a title of up to three lines, each of which can hold as many as 40 characters. After typing in each line, you specify size (choice of eight), colors (choice of eight, but limited to your output hardware), font (3 are available at any one time, although there are 11 fonts in total), and justification (left, center, or right). You can enter foot-



Classic, you print and plot menu This lets you change elements of the

notes of up to three lines, which will be displayed at the bottom of the graph; here again, you can select size, color, font, and justification. If you make no selections, Twin Classic will default to a standard size and font, will format black color, and will center the titles and left-justify the footnotes.

The second page of the pop-up menu deals with the axes. Twin Classic will automatically assign values to both axes if you leave these spaces hlank, but you can also add a second v axis, change the scale, and add a grid or frame to your chart. If you like, you can decide where tick marks should go and how many you want to display. You can choose between small and large labels and legends (the default is small)

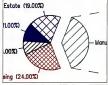
The last page of the customization menu lets you define the chart's attributes. These include colors and patterns. Eight of each are available, but the color selection matters only if you intend to plot the graph.

since only three colors can appear onscreen at one time. Bar charts can be exploded, and if you are building a pie-bar chart, you can select the data range, label range, and subtitles here.

With Twin Classic, you do your printine and plotting through the graph submenu. not through a 1-2-3-style separate utility. The advantages are clear: you can quickly change any of the elements of the file you are about to plot. However, you are also limited to only three fonts at a time, and you can't move, rotate, or change the size of the graph on the page-all of which you can do with 1-2-3. Twin Classic's hardware setup is completed ahead of time directly from the main menu.

SLOPPY SCREEN If this program works well in creating hard copy, it falters badly on-screen. The video display is quite sloppy and lacks sharpness. Don't expect an EGA monitor to solve the problem-Twin Classic won't take advantage of the improved screen, so your EGA output looks like a CGA picture.

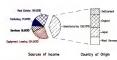
If you're looking for a 1-2-3 spreadsheet lookalike, you should probably at least consider Twin Classic for \$99. Solely from a graphics standpoint, however, the package can do some things 1-2-3 can't, and vice versa. Though you might make some beautiful graphs, you'd better be ready to plot them, because this program's screen representation may disappoint you. - Christopher Barr



Twin Classic, a 1-2-3 clone, offers a few improvements over Lotus's package. The must noticeable is the number of graph types offered: Twin Classic has eight to 1-2-3's five. The package lets you specify titles of no to three lines, gives you a choice of eight chart sizes, eleven fants and right left and center justification. You can also enter footnotes of up to three lines. The package outputs to printers and plotters (used here)-you can plot up to eight colors. Unfortunately, you can only display three colors

TWIN CLASSIC

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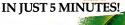
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First, it installs so easily. It is a half slot card, only five inches in length. You don't even have to give up a full slot. Marks mer unlike competing products it works in the Compaq and most clones. The instructions are so simple we considered showing a picture of a child putting it in. Easy diagrams show how you just place the card in an open slot, remove the original processor and connect a single cable. There is no software required. From that moment you are running faster than an AT.

Second, it is advanced. The BREAKTHRU 286 replaces the CPU of the PC or XT with an 80286 microprocessor that

is faster than the one found in the AT. A 16K cache memor provides zero-wait-access to the most recently used code and data. In benchmark tests the card accelerated software programs—both custom and off-the-shelf anywhere from to as much as 700%. Wow!

Third, you have full compatibility. All existing system RAM, hardware, and peripheral cards can be used without software modification. It operates with LAN and mainframe communication products and conforms to the Lotus/Intel/ Microsoft Expanded Memory Specification (EMS). Software compatibility is virtually universal

Fourth, it is the best there is. There are several other boards on the market. Some are priced about the same as the BREAKTHRU 286 and some are cheaper. We at PCSG have BREAKIHKU 286 and some are cheaper. We at PCSC have compared them all, but there simply was no compansion. What we discovered is that many cards being sold offer only a marginal speed up in spite of their claims. We found some to be merely versions of the obsolete 8088 or 8096, and others to be just poorly engineered. The 8MHz BREAKTHRU 286 is unequivocally the best executed and most completely reliable

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Loads with the DOS - always ready as a background program (like Sidekick) to accelerate disk access. You do nothing — everything is automatic.

You are going to be so amazed when you start to work with LIGHTNING installed. Most programs that frequently access the disk (hard disk or floppy) are made instantly faster - up to 2 to 4 times faster. It is so easy to install and you never have

Disk instensive programs (like databases) can run 2 to 4 times faster.

to do anything again: it does it all for you like lightning

LIGHTNING comes to you on a diskette. You simply load it onto your DOS diskette if you are using floppies, or if you have a hard disk, into the DOS area. Simple A-B-C instructions let you get it started the first time in five minutes. Then it is always ready, working automatically in the background any time you boot up. (The copy protected version is a "key diskette" and doesn't boot with the DOS.)

What's it like to use it? If you have ever worked with or seen a RAM Disk you know what a difference speed can make when working with any program that frequently accesses the disk. Well, LIGHTNING

enables those programs to approach the same rapid speed as a RAM Disk, but it does it without the disadvantages. With a RAM Disk there is a constant danger that you can lose your precious data if you forget to copy it back to the disk drive. With LIGHTNING vou just use your programs normally. You don't have to remember any-

LIGHTNING has a fun feature that shows you just how fast you're operating. Any time you want, with a couple of keystrokes you can see a screen that keeps a record of how many times you've accessed the disk. and how much time **LIGHTNING** 'has saved you. It's fun to check it out, and it's always astounding. Speed-up varies, depending on your application, frequency of disk access. and amount of RAM you can allocate. For example, best results occur with indexed

When you work with a database program or most word processors, or any time you need to frequently load files into RAM or save them back, you are accessing your disk. It is such a pleasure to cut those times often in half and up to one-fourth. Spreadsheets can speed up their loading

databases.

and saving. Recalculation speed is not

affected. Another plus - UGHTNING fully exploits Above Board" memory for PC's with that addition.

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If you have an IBM PC or clone and don't have LIGHTNING", we simply have done a poor job

explaining it to you. the lan portable market with ROM software such as Lucid spreadsheet and Write ROM that reviewers rated as excellent. We are proud to enter the IBM PC market with LIGHTNING: It's a great product that we

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PCSG provides hotline support for the IBM PC.

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dBChart

A utility program that converts dBASE II and dBASE III databases into graphs, Wordtech Systems' dBChart cannot run without a version of dBASE. So if you don't use dBASE, forget it. But if you are among the hundreds of thousands of dBASE users, you'll find this program quick to learn, easy to use, and fairly functional.

dBChart offers eight different graph types, including column, stacked column, deviation, line, step, pie, doughnut, and pictograph. The program's pictographs use symbols to represent quantities of items. dBChart comes with six standard pictograph symbols and lets you design and save your own symbols with simple cursor movement to turn blocks on or off in a simple 16 by 32 matrix. In all, you can create and save up to 26 symbols.

Installing dBChart doesn't take long, but it does involve a few requests that might put off novice users unfamiliar with DOS. You are asked to invoke the DOS GRAPHICS command either in your startup batch file or at least before running dBChart. For some dot matrix printers, even if it claims IBM graphics compatibility, dBChart requires that you send an Esc+"1" code to correct vertical spacing. These two requests should be simple enough for savvy dBASE users, but confused beginners may need to seek help.

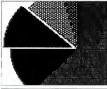
dBChart's screen output is limited to the Color/Graphics standard, which is very harsh if you're used to EGA-quality graphics. If you choose dBChart's "high-resolution" graphics, you get a yellowish color (mustard on my MultiSync) on a black background. The dBChart menu is always in "high-resolution" mode. The program can draw graphs in standard IBM CGA colors, however-either cvan, magenta, and white, or green, red, and yellow. Both color sets use a blue background. You can live with dBChart's screen resolution, but it seems rather crude when compared with that of many other graphics products on the

dBChart is also quite limited in printer

selection. The only form of hard copy available is that from either IBM or Epson graphics printers or compatibles. The program doesn't support plotters, laser printers, or any other devices. Printing, howevcr, is very easy.

dBChart runs easily-using just seven function keys, F1 through F7. There's not much to the manual, but what's there is very clear.

USING dBCHART When you use dBChart, you first go into dBASE and Use (a dBASE command) the file you want to convert to a graph. From within dBASE you run the dBChart conversion program (either GRAPH2 or GRAPH3, depending on the version of dBASE you're using) and



dBChart's appeal is that it works directly with dBASE. It can do some fancy things like explode pie segments. But if you're looking for uality output, you might want to look elsewhere. The only form of hard copy output is from IBM or Epson graphics printers or compatibles. The program doesn't support plotters and will support laser printers only if you purchase Lasercontrol software from Insight Development Corp

f.6=Print f.7=Color





Orlinda, CA 94563 (415) 254-0000 List Price: \$99 Requires: 128K RAM two disk drives: DOS 2.0

pris: IBM CGA and PGA (in CGA ode). Dot matrix and ink jet printers: HP Laserjet (optional; you must use Insight Development Corp.'s Lasercontrol software). In Short: dBChart is a simple and fairly easy-to-use utility program that converts dBASE II and III files into charts. It will not work without dBASE. Not copy protected.



GRAPHICS SOFTWARE ON DISPLAY: Dedicated Charting Software, Under \$100

follow screen prompts to choose a sort field and a label display field. You also choose or skip other fields for inclusion in your chart. At this point you also enter a title and a footnote (used like a subtitle), each of which can be up to 60 characters long. When you finish answering the prompts, your converted file is saved with an .ASC extension. Your original .DBF file is not affected.

To create a chart, you next exit dBASE and issue the command dBChart filename.ASC. dBChart loads the converted dBASE file and lets you modify the presentation aspects of the data, depending on the graph type you choose. Modifying a graph is easy, using windows that present current settings of various parameters and give you the option of changing them. At this point, you can print the file or save it for

further use. Be careful when you run dBChart. Writing to an open disk drive yields an "Abort, Retry, Ignore?" message, and trying to save on an unformatted disk gives you a General Failure Error; unless you put in a formatted disk, you'll lose your work. Trying to print with no printer booked up or with the printer in off-line condition will hang the program until you either turn off the printer or put it on-line.

dBChart's appeal is that it works directly with dBASE. But many other programs will read .DBF files or comma-delimited files (both of which dBASE can create, as well as ASCII print files), and you may find that some of these other programs offer better use of the screen, support for more hard copy devices, and fancier and more numerous graph styles. The other programs often can also use files from programs other than dBASE, as well as create their own data tables for graphs.

Even though dBChart's pictograph symbol function, with its ability to create custom symbols, is an attractive feature, it too is just an added property of a program that still remains a utility for dBASE. If you're not already a dBASE user. dBChart's appeal isn't strong enough to justify buying dBASE for the sole purpose of entering data into dBChart. In sum. dBChart is a single-purpose program-for dBASE users only-that would be a buy at \$25 but is easy to exclude from your list at \$99 -Bruce Brown

Giraph Business Graphics When it comes to business graphics

choices, it's a jungle out there, but there is a graphics package that stands head and neck above the others. Giraph Business Graphics, from CompuVision International, is an inexpensive graphics package that lets you create, modify, and plot a wide variety of graphs. Point-and-shoot menus guide you through the graph-building session, making the process easy. When the graph has been completed and you are satisfied with the screen version, you can send the output to a printer or plotter.

You can create many different charts

with Giranh, including the basic scatter. step line, line, vertical bar, horizontal bar, pie, high-low-close, and text charts. Within these main categories, there are options, such as making vertical and horizontal bar charts regular, clustered, stacked, 3-D, or 3-D stacked, and also combining graphs. for example, combining a vertical bar chart with a line or high-low-close chart.

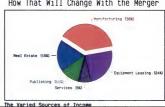
The first time you dive into the program, Giraph prompts you for setup parameters. You can specify the drive and path, units of measurement (inches or millimeters), and plotter. If you select a plotter, you can then pick the COM port, bitper-second rate, and pen colors. The settings are saved and can be changed at any time.



Although it is inexpensive, Giraph Business Graphics letx von create ment different chara types. including this exploded pie. You must insert all tides and labels manually, excent for the x axis. which can be inverted either manually or automatically. But Giraph has a floating-text oution that gives you up to 18 lines of up to 40 characters each that you can place envelore on the chart. The package outputs to printers and

ploners only.

GILADU BARIUGRE PLANUICR How That Will Change With the Merger



GRAPHICS SOFTWARE ON DISPLAY: Dedicated Charting Software, Under \$100

Data entry is handled in a smooth, orderly fashion. Giraph can read 1-2-3 .PRN files, .DIF, SYLK, and ASCII files and can receive data through the keyboard. It creates a data-input grid similar to a spreadsheet, with a 20-character label column on the left and data columns on the right. After you enter data, each row will be a data bar and each column, other than the label column, will be an observation or data point.

As soon as you enter data you can view the graph. The on-screen palette can be changed by pressing F9 and F10, but this has no effect on any output you might create. Then to edit the graph or the data, just press Esc to return to the action menu.

SELECTING TYPE SIZE All titles, labels, and legends are inserted manually, except for those on the x-axis, which can have either manually or automatically inserted date labels. Titles can be one, two or three lines and can have up to 40 characters on a line. Once you input the title, you can choose one of five character sizes: tiny, small, medium, large, or huge. Choosing a character size is a bit difficult, however, because on-screen you do not see much difference among the sizes. The choice comes into play only when you produce hard copy, and then the only way to determine the exact size of each character

is to make the output and visually compare the results. You can also select colors for the titles, but only if you had previously entered the different colors available on your plotter. Titles can be left or right justified or centered.

Giraph has a floating-text option, whereby you can have up to 18 lines of up to 40 characters each that can be placed anywhere in a chart. It takes a little practice to place the text exactly where you want it. You can use any of eight character formats

with all titles, labels, and text. There are design menus that enable you to accessorize the graphs. You can choose from six hatching patterns with five densities, change a chart's axis height and width, add tick marks or grids, and move legends around. You can rotate a pie chart to different starting points, place values inside or out of the slices, and segment any or all of its slices.

Giraph has a batch option that is used to display or print up to 100 files. This feature is especially attractive if you want to send multiple files to a plotter or create a slide show to save and display again.

There's a tutorial in the manual, but the program is so easy to learn you probably won't work all the way through it. The manual itself is understandable and clear. Sending your output to a printer or plot-

ter, or, in fact, using any feature is simple with Giraph; just follow the menus. If you need a graph program to make standard types of charts and graphs, try Giraph. It's versatile, inexpensive, and easy. -Christopher Barr

Graph-in-the-Box Graph-in-the-Box, from New England Software, is a RAM-resident graphics program that can grab and graph any data on your screen, including word processing, spreadsheet, and database files-even file sizes in your directory. For \$97.60 in the copy-protected version (the non-copy-protected version is \$50 more), Graph-in-the-Box may be just the ticket if you need to make graphs from a variety of data sources quickly and easily.

Beware: Graph-in-the-Box uses a good deal of RAM-a total of 129K bytes. To guarantee that there will be enough memory for your application, you'll have to limit

the number of other RAM-resident programs you install. (One big concern with RAM-resident programs is their compatibility with Borland International's Side-Kick. Graph-in-the-Box and SideKick work together just fine-when you load SideKick last.)

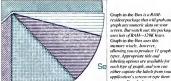
You install Graph-in-the-Box with the easy-to-use, menu-driven GBSETUP program. The GBKILL command is a nice feature that lets you uninstall Graph-inthe-Box, thereby freeing up RAM space. Some other RAM-resident programs aren't so polite.

EASY DATA CAPTURE Selecting data from the screen is simple. You use the cursor keys to move to the beginning of the desired block of data, press Enter to mark it, then move to the end of the block and press Enter again. You are limited to capturing data that can be shown on one screen, because while you're in the Graphin-the-Box capture mode, you can't move the screen on your original program. If the data you want extends off the screen, you have to save the first batch in Graph-inthe-Box and then go back to your application and get another screen's worth, and so on. You also use Graph-in-the-Box's data facility to enter data, labels, and titles for your graphs.

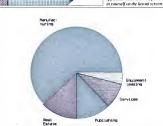




GRAPHICS SOFTWARE ON DISPLAY Dedicated Charting Software, Under \$100



Graph-in-the-Box is a RAMresident package that will grah and graph any numeric data on your screen. But watch out: the package uses lots of RAM-129K hytes. Graph-in-the-Box uses this memory wisely, however, allowing you to produce 11 graph types. Appropriate title and labeling options are available for each type of graph, and you can either capture the labels from your



With the captured data, Graph-in-the-Box can produce [] graph types, including column and bar, stacked column and bar, line, area, step, scatter, pie, and mixed charts. You can even display different data items in different ways within one graph; for example, you can display one data item as a line, the others as bars.

Appropriate title and labeling options are available for each type of graph. You can type titles and labels on the layout screen yourself or capture them from your application's screen.

The Graph-in-the-Box manual is very good but tacks an appendix listing the supported hardware. The manual includes a quick-reference page inside the front cover that defines the use of the function keys

and other control keys. The reference page also gives an eight-step minitutorial that presents a quick overview of how to use the program

The copy-protected version of the package can be installed twice on a hard disk. New England Software will replace bad system disks at no charge for registered users. They will even send the new disk before they receive your original disk-a relatively painless, user-supportive approach to copy protection.

Graph-in-the-Box is best used as an extra program to grab data to create quick graphs. For that purpose it can't be beat. But its ease of use and value for the price also make it competitive with standalone graphics programs.—Bruce Brown

Micrograph

usefulness is questionable.

Micrograph, priced under \$100 from Willy Verbestel, gives you the basics: bar, line, pie, and scatter graphs. A menu-driven program, it can be learned quickly, and it has some other fine qualities-it can produce two pie charts on the same page, for example, and can plot a trend line on a scatter diagram. Set against these advantages, however, are a legion of shortcomings. Even at so low a price, the program's

The problems begin with the manual. Although it's punched for a standard IBMstyle binder, you must supply your own: the pages come in a Ziplok baggie. The manual has a table of contents but no tutorial or index. In fact, of its fewer than 50 pages, many are simply representations of sample printouts. The reference material is loosely organized along the lines of the menu ontions, so you stand some chance of finding what you need when you get stuck. Given the size of the company, however, technical support could prove difficult to obtain.

Enter the program and things get even messier. Data entry is tricky, since you have to move the cursor through all the screen data fields each time. Occasionally, you may be asked to enter data for a series that you don't want to define; the program doesn't make it clear when this data will





Willy Verbestel Inc. P.O. Box 4373 Burlingame, CA 94011 (415) 505-1145 List Price: 595 Requires: 128K RAM:

one disk drive: DOS 2.0 or later Supports: IBM CGA, Dot matrix and ink jet printers; plotters. In Short: Although Micrograph is easy to

learn, doesn't cost much, and can support a popular plotter, it's a minimal system supporting a minimum of output devices with a minimum of formatting options. Not copy betreten

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GRAPHICS SOFTWARE ON DISPLAY: Dedicated Charting Software, Under \$100



Micrograph can be learned quickly, and it has some other fine qualities but set against these advantages are a legion of shortcomings.

take and when it will be ignored. Moreover, on our tests for robustness, *Micro*graph showed uneven error-trapping. It would sometimes dump you to DOS when you least expected it.

Still more unsettling, Metrograph creates a new 'layout' (rapph definition) every time you modify an existing one. The new layout has been sent title as the original (unless you change it on purpose), so you can end up with a list of identical names without knowing which is the one you want. There's also no way to delete an individual layout—all are stored in the same DOS fills for a single session. To clean house, you have to open a new file and house, you have to open a new file and house, you have to open a new file and house, you have to me the other than the copy the layouts you want from the other

This program won't give you the most attractive output, either. The only forn available for headings is a fairly angular sans-serf typeface. You can set up headings for the: a rady axes and label the units for the y axis, but you can use only a few characters for cach. On a pic chart, you get only ten characters to label each segment; on the dual pic chart prinout, you can't make separate headings for the two eranbs.

THREE DRIVERS Micrograph's limitations do not stop there. It supports a grand total of three output devices: Epson MX printers, the HP 7470A plotter, and the Radio Shack CGP-115 (an inexpensive device that draws using little ballpoint pens). The program wouldn't work with the IBM Graphics Printer used in this project, so we had to use the HP 7470A plotter. The results were fairly good, with a few puzzling exceptions. For example, you can print overlapping bars to give a simulated 3-D effect. Unfortunately, though, the plotter actually overlaps the bar plots, and the mixed colors that result are not always attractive. Also, if you're using different pen colors on the dual pie chart, you have to make endless pen changes because the program plots one chart completely before it starts the other.

The program's publisher makes a point of its data-import capabilities: .DIF. SuperCalc, and dBASE. Once you get into the manual, however, you'll find that this, too, has a catch. The .DIF files must be carefully formatted with arcane "flags" set in the leftmost column and across the top. SuperCalc works the same way, except that you turn the worksheet into a print file before bringing it into Micrograph. Only the dBASE import worked with our test files-and then only for bar charts (though the program wouldn't let us specify years as headings for them). The data for the pic charts from our dBASE import was incorrectly organized.

was incorrectly organized.

If you need a low-end program, you like the way that Micrograph formats its graphs, you can put up with its limitations, and you happen to have a printer or plotter that it can talk to, then it might be worth risking \$100 on this one. Otherwise, you would do well to look elsewhere.

—Alfred Poor.



Micrograph, though easy to learn and law cost, can produce some fancy outputs, such as two pie charts on the same page. However, the program has significant limitations. On the pie chart, for instance, you get only ten characters to label each segment: on the daal pie chart printout, you can't make separate headings for the two graphs, Also, the package supports only three output devices: Epson MX printers, the HP 7470A plotter, and the Radio Shack CGP-115, a device that draws asing little ballpoint pens.



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destroy hours of work. Lotus HAL also makes developing macros simpler than ever-so simple, in fact, that even novice users can create 1-2-3 macros with Lotus HAL. And no matter how familiar with 1-2-3 you are, you'll benefit from being able to write and test macros to make sure they do what you had in mind.

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entire sheet "manually." Best of all, while Lotus HAL greatly enhances 1-2-3's commands, it doesn't change either 1-2-3 or the worksheet. It's always available, but it never gets in your way. And you can share data as freely when you're using Lotus HAL as you did when you were using 1-2-3 alone.

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The Benchmark Graphics

The Benchmark Coraphies program is put of the Benchmark series of applications programs from Benchmark Soff-awareMetasoft Corp. Besides the graphies program, the series includes a word processor, data manager, spelling checker, mailing list, font builder, message pad, notepad, three-dimensional spreadsheet, and telecommunications. Also part of the Administration of the processing the program called The Administration, and operation of alther bondless. The Benchmark Coraphics is powerful, with many features, but the current version is fairly difficult to use rut version is fairly difficult to use

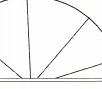
rent version is fairly difficult to use. The program has five levels and types of commands: primitive, system, busines graphies, output, and user-defined. You can choose the command options from the three-letter, horizontal menus or issue the commands directly from the keyboard. The program's user prompts are too opsrase, which, coupled with the number of commands and features, makes its power somewhat inaccessible.

The separation of each feature is re-

sponsible for the primary difficulty in using the program. If you want to change from using a printer to using a printer to cample, you have to go to The Administrator to reconfigure, restart the system to set the parameters, and then start to plot, so the parameters, and then start to plot, and the start of the printers, and then start to plot, ready to go at the same time. When you cready to go at the same time. When you cread to go at the same time. When you may be a support to the same time. When you work on data or graph parameters. I found myself having to move around to different parts of the parameter of the that scened reason-

DOING WHAT YOU WANT The Benchmark Graphics' considerable power consists in allowing you to do almost whatever you want with your screen. You can create and store geometric or freehand line images, call up fill patterns and colors, and enter text wherever you like. The foot builder lets you create your own custom fonts. By creating, naming, and swring inges, you can use a slide show-libe replay capability on the cattern. The labor involved it was the contraction of the contraction of the three contractions. The labor involved it is there because of the program's rich list of features.

The Benchmark series comes with the Benchmark Tutor Training System, which includes a separate book for each of the program's major modules. The book for The Benchmark Graphics includes four lessons on creating and using graphics and



RENCHMARK

The Benchmark Graphics outputs to printer and poluters only, and so the image below was created using a plotter. The package offers quite a few features, including the ability so place text wherever outputs. However, the labor involved in using these features is significant: the program's user prompts are sparse and the number of commands that you must learn are numerous.

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Leosing



List Price: \$199 (with font builder), \$345 (with font builder, word processor) Requires: \$34K RAM; two disk drives; DOS 2.0 or later. Supports: IBM Monochrome Adapter and CGA: Hercules monochrome graphics card:

CGA: Herudes monochrone/graphics can Plantones Color Graphics adapter Dot matrix, lok jet, and laser printers; plotters In Short: Powerful The Benchmark. Graphics has many features, but accessing them is a bit awkward, especially for beginners and essaul users. Not copy protected. SUBJECTS
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Nanufacturing \$2.00

Real Estate

THE VARIED

two lessons that cover integrating graphs with word processing documents and using the custom font builder. The tutorial provides step-by-step keystroke instructions, but it has very few illustrations and no photographs.

The Benchmark Graphics manual describes all the program's features, but it uses tiny type on colored pages, coded by application, and is a bit hard to read. Each section of the manual has its own index, but I found it difficult to find information to rise the sections together.

There is no way to quickly find answers to many questions in the manual. When I called Metasoft for help with creating In ad printing graphs, however, I found the technical-support staff to be helpful and very courteous.

courteous.

The program could use better errotrapping capabilities. However, the one
problem with disk access that it does cope
with successfully is being told to write to a
full disk. The Benchmark Graphics responds with the message that there is insufficient disk space and then comes back to

the program immediately. The Benchmark Graphics is best suited for someone who wants to create highly customized graphics. It has terrific potential because of the combination of drawtice of the combination of drawtice of the current programs is solvaward to use and involves a lot of effort—not a good choice for the custom of the graphic programs. So useful to learn and use and its manual and user interface are improved, its true potential will probably go unrealized except by the most adventures one.—Bruce Brown

Boardroom Graphics

According to many software manufacturers and users, a large number of business users like their software cheap, easy, and quick. Analytical Software's Boardroom Graphics is a basic, no-frills package for just these people.

You'll get an idea of the product's general orientation the minute you open the manual or call up the opening menu. Boardroom's default configuration is set for a single drive; the program starts with an ALITOE-SEC BAT file, and the man-

ual neglects to give instructions for harddisk installation until you have reached the instructions for calling up the package. At any rate, even if you're knowledgeable enough to immediately copy the program over to your hard-disk subdirectory, you'd better have that floppy disk in the A: drive; Boardroom Graphics is copy protected



Analytical Software's Boardroom Graphics is a basic, nofrills package for business users who like their software cheap, easy, and quick.

with a key disk.

The opening menu gives you the choice of changing your present configuration, starting a new graph, or choosing a previously created one. It also allows you to choose your default drive; unfortunately, the program does not save the drive configuration and will always pop back to a default of A:

GETTING DOWN TO CASES Boardroom Graphics operates in what it calls "cases," which are groupings of nine graphs (this setup permits the program to show the nine graphs in "slide about" for what is free-chanter appellation. It's easy enough to move from chart to chart within a case—you simply must go back to the menu and call up a different chart. The caches journed to the chart within caches journed to the chart within caches journed to the chart caches journed to caches journed to caches journed to caches journed to the chart permits of the chart caches journed to the chart caches journed to the chart caches journed to the chart caches journed caches journed journed

Before inputting any data, you first determine the structure of your graph using a very simple, one-screen menu format. It is here that you decide upon such items as titles, legends, and axis criteria. The program offers a nice range of graph types, in-

cluding both two- and three-dimensional bar charts, pie charts, line charts, and scatter plots. However, while the program can merge two charts on one page, it will not merge bar charts.

The number of items that can be plotted on one graph is electrained by the type of graph you choose. For example, most applies are restricted to three items per graph, unless you are creating in untihade inte graph, a per dark, or a bar chart for use can graph up to five items. Each item is limited to a 10-character label; axis labels are limited to 16 characters. There are few items of any belt and whites here, except for it was in the contract of the characters of the contract of the characters. There are few it was the contract of the characters of the contract of the characters of the characters

Once you have set up your chart, you can input your data. While Boardroom Graphics has a facility for accepting 1-2-3. DIF files, you must first set up the files in 1-2-3 in a manner that fits the program's format. I found it easier to simply input the test data directly.

Once the chart is complete, what gets principle is not what you see on-screen. For example, in my test bar chart, years were written out in the plotted graphs (i.e., 1981), but only the last two digits (81) showed on-screen; the vertical legend was printed sideways, but on-screen it appeared vertically, one letter below the



GRAPHICS SOFTWARE ON DISPLAY Dedicated Charting Software, \$100 to \$499



Boardroom Graphics offers o nice range of graph ripes but with some restrictions. For instance, while the program can merge two pie charts on one page (shown here), it will not merge but charts. Also, o pie chart plotted with o six-pen plotter can show up to only five items. The program outputs to printers, plotter, ond the Poloroid Polette image recorder. The pie chart below was plotted.

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Income

BOARDROOM GRAPHICS

Created Using BOARDROOM GRAPHICS

next. The plotted vertical axis increased in increments of 8, but on-screen in increased in increments of 10 grid lines were unbroken on paper, hoken on-screen, Many of these differences are due to Bourdroom Graphics, Version 3.0's rather primitive on-screen graphics capabilities. Version 4.0, which is expected to be available by the time this review appears, should take better advantage of your EGA board.

All in all, Boardroom Graphics is a basic business graphics program that produces good, basic charts for a reasonable price. Smaller operations with an occasional need for an illustrative pie chart could find it a handy addition to their software libraries, but larger companies who want to produce more sophisticated or varied graphics will have to look elsewhere.—Barbara Krasnoff

Chart-Master

Anton-Task Schar-Master is a dependable old-inner in PC grabies, but like a Matton-Task Scharber in PC grabes, but like age, its turf includes bur, column, line, seater, and read, and pie charts. Mixed charts, charts with two axes, and multiple charts on the same page are all accommodated. The novice can create excellent charts with very little effort, while the advanced user can scroll through nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options to add some artistic control (though nine screen pages of options that the screen pages of the screen pages of the screen pages of the screen pages of the screen pages

not as much as some might prefer). Other programs give more bang for the buck, but generally *Chart-Master* is an effective tool.

A Char-Master session begins with a main mean of nine items, each other carries a selection of fill-in-the-prompt submenus. You can select command with the cursor keys or, more quickly, by typing in the corresponding command number Select Create a Chart, and the program methodically leads you through a series of input screens, from chart title through data. All title and data entries are independent of the chart format, so you can graph the same data in different ways.

As you enter chart text information on the uper portion of your screen, the lower portion displays six options that let you see that you eight forms, i. 5 sizes, istaics, justification, color, and underlining. Although you cannot manipulate the for characteristics, all of them—standart, more considered to the characteristics, all of them—standart, more considered to the considered to the





Version 6.22 Ashton-Tate 25 Sylvan Rd. Westport, CT 06880 (203) 222-1974 List Prices \$375

Requires: 256K RAM (320K RAM with printer or Polaroid Palette output); one disk drive; DOS 2.0 or later. Supports: IBM Monochrome Adapter, CGA, and EGA; Hercules monochrome/gra phics card. Dot matrix, ink jet, and lisser printers; plotters. Polaroid Palette and HP 7510A imase recorders: Video Show 160

In Short: An easy-to-use chart maker with a quick file-importing facility, this program can accommodate multiple charts on the same page and has a number of advanced, user-definable options for customization. Its text-promoted edit feature could perplex some users. Its companion is Sign-Master for text stillacs. Copy protected. ©MOLE BROWNERS SERVICE AND

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GRAPHICS SOFTWARE ON DISPLAY, Dedicated Charting Software, \$100 to \$499



One of Chart-Master's most powerful features is its options menu. The options menu gives you access to an extensive symbol library, and a floating-legend option lets you add text after you've formed the graphics template. Chart-Master outputs to a variety of devices, including printers, and several image recorders, such as the IPP 5710 with which the image below was



STAT CLASS Unlike some packages that give you a visual row/column input format, Chart-Master operates in a nonvisual (and sometimes confusing) text environment. Moreover, Chart-Master's text indicates the continuous pairs and in the continuous pairs and

Once you can identify variables and observations, entering data manually is straightforward. Moreover, the new and much-improved Datagrabber facility, which imports files from other programs, is quite manageable. It can read .DIF, SYLK, and ASCII files and can graph all or part of the imported files as you highlight the blocks in question. Unfortunately, editing a data chart is not as pleasant as creating one. Without seeing your data, you must choose it or modify either a single your must choose to modify either a single your must choose the rather or observation. There is no option to deal with a range of data.

Chart-Master does not allow you to store your charts in a directory separate from the program's. Even when you've just saved a chart, prompts informing you

that it will be erased still come up to haunt you. But by far the most annoying omits on the hast of a pop-up directory when you want to retrieve and save charts. If you don't know a flie's name, you must trudge back to the main menu to see the list and then return. Also, the display screen should definitely contain the name of the current chart. It doesn't.

One of the program's most powerful aspects is its options menu, which lets you alter various elements of your chart such as hatching, grids, axis scalings, linetype, and location of the elements. With a new floating-legend option, you can add text after you've formed the graphics template. The nine pages of options are a mixed bag: some are toggles, some bring up their own menus, some request user input. In the end. I found the process quite manageable, but after wading through so many options. I expected better results. While the options are certainly comprehensive, a package that specializes in charts could use some whiz-bang enhancements such as 3-D, fill patterns for symbols, and some freehand capability.

Church/duser's hardware support just gags better and better. The program can automatically detect the presence of an Ehmaced Color Display. You can print your chart on-screen in either high resolution or with one of two color palettes in medium resolution; the program handless either one quickly and efficiently. It can joint multiple charts using a batch file command, and it also supports a shopping 80 device did also supports a shopping 80 device did with the color of the color of

On all of our tests for robustness, CAMMASSEP performed well. The program is copy protected, however, and I couldn't install it on an AT clone. Still, perhaps Decision Resources, now owned by Ashton-Tate, will follow other companies' example and eliminate copy protec-

tion. Chart-Master has survived many shakeouts, with each release emerging stronger than its predecessor. While the program requires more visualization from its users than some of the row/column chart makers on the market, those who use it well can truly become masters of their charts—Robin Raskin

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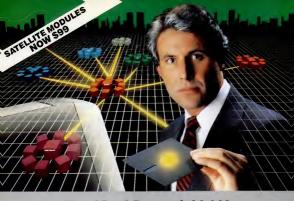
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Decision Graphics

Here's a product that will make you glad you spent the extra money for an EGA monitor and graphics card, because Decision Graphics gives you beautiful screen output. Samna Corp. 's Decision Graphics is a well-organized program that combines menus and macro commands to give you a choice of ways to use the program; it also lets you customize data, text, and whole graph screens. At \$450. Decision Graph-

ics has to deliver a lot, and it does. The program nearly installs and configures itself; you just sit back and let the software take over. Which is a good thing, since Decision Graphics has a lot of program files: if your PC, XT, or compatible has only one floppy disk drive, you're out of luck. Decision Graphics will run on a floppy disk system, but only if you have a 1.2-megabyte disk drive, the type common to most ATs and AT compatibles. Since the program has a lot of modules that are used only when needed, its developers obviously decided that swapping the

smaller, 360K-byte floppy disks would be inconvenient. With a hard disk drive system, though, it's okay to have only a 360K floppy disk drive because that drive is just used to load the software on the hard disk drive when you install the program.

Decision Graphics uses both menus and a command language, easing your way into the program with the helpful prompts of menus and then letting you take over with the speedier commands once the functions and operations become easier to use. The program has many features, so it can't claim to be very easy, but Samna has done a lot to help. You can use either the menus or the commands at any time-a helpful way for beginners to gradually break into using commands and for experts to get help with seldom-used features.

When you're creating a graph, the Main Menu screen is divided into three vertical areas: menus on the left, data memory in the middle, and macro memory on the right. A command line extends across the bottom of the screen. This screen acts as the manager for the whole graph-making process. Whenever you are engaged in a specific step, such as choosing colors, writing screen text, or importing data, you leave the Main Menu and go to screens that handle the specific function, returning to the Main Menu screen when you've completed the task.

I like the way Decision Graphics imports data from other programs. Entering data from the keyboard is simple with this program, and importing files from other programs is equally easy; you follow some very clear questions on the screen (a printout of the data is helpful when answering these queries). You can import 1-2-3 WKS and .WK1, Symphony .WRK and WRI. SYLK, DIF, and ASCII print files.

The program gives you a great deal of control of visual presentation of data. You can combine up to ten different graph types in one graph, using all but pie graph, charts, or pyramid types in combined graphs. Graphs can be presented in two or three dimensions, and a zoom feature isolates individual data sets or times.

VARIOUS WINDOW TYPES Decision Graphics allows you to use three different types of windows; standard windows for one-quarter, one-half, or whole-size graphs, variable-sized windows, or legend windows. You can overlay as many windows as you want, the number limited only by the resolution of the display or printing device.

In addition, you can perform calculations on data items. Decision Graphics lets



Samna's Decision Graphics nearly installs and configures itself; you just sit back and let the software take

you use prerecorded functions, or you can create your own formulas and functions using standard operators. The prerecorded functions include several statistical and scientific operations. You can also use regressions to plot trends of graph data.

Decision Graphics makes extensive use of macro commands. The program's existing macro commands, which can be used to run the program, consist of an apostrophe and four or five letters. The macro ERDA, for example, tells the program to erase data. In addition to using the built-in macros, you might want to use the macro language on the screen's command line to combine macros or create macros that define data, text, or whole-screen images. Once you get up to speed with Decision Graphics' macros, you can save a great deal of time and automate much of your work, especially if you use repetitive graph, text, or data settings.

Decision Graphics' slide-show capability combines screen macros with the 'WAIT command to display graphs continuously on the screen. You can make the graphs pause for a specified number of seconds ('WAIT10 for a 10-second pause) or assign a long time delay and then hit the Spacebar to bring up the next slide when





Decision Graphics, Version 2.0 Samna Corre 2700 NE Expwy.,#C-Atlanta, GA 30345 (800) 831-9679 (outside Ga.)

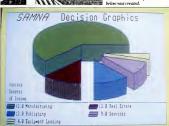
List Price: \$450 Requires: 256K RAM, 384K RAM with EGA: hard disk: DOS 2.1 or later Supports: IBM Monochrome Adapter, CGA, and EGA; Hercules mone chrome/graphics card; STB card. Dot matrix, ink jet, and laser printers; plotte Polaroid Palette and HP 7510A image

In Short: Samna Corp.'s Decision Graphics is an impressive program that uses comprehensive menus to accomplish all functions. It gives you the ability to create multiple graph windows; macros for screen, data, and text; and continuous running slide shows. You can also use Decision Graphics to calculate data items, plot regressions, and write text anywhere on the graph screen. Not copy protected. 655 ON READER SERVICE CARE

GRAPHICS SOFTWARE ON DISPLAY: Dedicated Charting Software, \$100 to \$499



With Decision Graphics, you can combine up to en graphs on one page, and with the exception of pie charts you can mix chart ryes, Graphs can be presented in two or three dimensions. But when you create a 3-D pie chart, you yet o 3-D legend as well. The parkage of output to printers, plotters, and image recorders, including the HP 75 10A, on which the pic chart below was created.



you're ready. The delay allows enough time for discussion between graphs.

Decision Graphics includes ten symbols that can be incorporated into charts. These symbols include a man, a woman, the Statue of Liberty, a tree, a house, the Eiffel Tower, and arrows that point up, down, right, and left. Saman Copy, will also create custom symbols for a fee. The program has no facility for building your own symbols, which limits the usefulness of this feature.

The program is flexible: you can open legend windows wherever you like on the screen, and you can write text anywhere you want. Decision Graphics lacks a default method of titling, though. To title

your graphs, you have to go through the Write menu and type the titles directly on the screen image of the graph. Beginning

the screen image of the graph. Beginning users will probably find this aspect of creating graphs the toughest part.

When you do create titles, you'll find that they don't print very well with a plotter. The technical-support people at Samas said that the proportional font was the best to use with a plotter; it worked but still wasn't very good.

This program is terrific at error-trap-

ping, fielding every dirty trick 1 tried. Samna has protected users against the most common errors that often send programs into computer limbo, along with data and graph settings. The helpful, well-organized documentation includes a 45-year tuttoria. The tuttorial relation includes a 45-year tuttorial. The quick reference to all the menus, including a list of all program macro commands. I was particularly impressed with the complete instructions for installing printers and plotters, a relief after using many program that leave hard copy output device installard to the default settings that list, but may not properly work with, specified printers. Also, when I called Saman's technicaling the setting and substitute, in our default with the complete and substitute, if ound them to be both knowledgeble and helpful.

Decision Graphice has a terrific user inreface and offers many impressive features. The ability to create your own data, etc., or whole-szerem narches lets you siginificantly speed up the graphing process. The one drawbasis is the program's better the procession of the data placement for graph titles, but it gives you complete flexibility for employing the placement of text. Decision Graphics is so to of program, greatly increasing regards processing ability to create visual representations of numeric data—Bruce Brown

Freelance Plus

Lous Development Corp. has released a unjoir upgrafe to its graphics program, Freedunez, adding a built-in graphing module and the ability to draw in freehand syle. It's Freedune Plus, a program for of their images and who want to output of their images and who want to output of the properties of their images and who want to output of the properties of their images and the properties of their interest of

The new graphing facilities allow you to create most common business chart formats, including vertical or horizontal bar charts and line, pie, and scatter charts. Freelance Plus enables you to enhance charts with free-form images that are created using all the tools common to a traditional graphics artist.

You can easily draw lines, boxes, and arrows and add text to an image. The program includes a predefined library of more than 500 common symbols, including maps of each of the 50 states. Optional

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form.
But first, let's take a look at R:BASE System V, the product which makes R:BASE Graphics a powerful tool for understanding.

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When you're done, you'll have automated the process of understanding your data. And be able to use ut to make better decisions. With other database products, building an application like that could take months. But for a fairly typical application, with REIASE System V it a matter of hours. For example, let's take a look at a company called ACME Novetties and follow them through a sales analysis.

To update a report like this takes just a few keystrokes, even though it contains computed columns, subtatols, and multiple toble access. And this is just the beginning: with new R-BASE Graphics, there are litterally thousands of ways to play with these numbers.



With our Express System, it's easy to build on automated application without programming From this point on, only at these functions can be performed by a simple menu pick.

INTRODUCING R:BASE GRAPHICS. TURN RAW DATA INTO PURE UNDERSTANDING.

Of the 100-plus graphics products on the market, this is the only one that works directly with R:BASE System Vor R:BASE 5000/4000 data.

works directly with RES System Vor REASE 5000/4000 data. And the only one that combines presentation-level graphics with powerful data reduction capabilities. With just a few keystrokes, REASE Graphics can sort

through megabytes of data, retrieve just the data you're interested in, compare items any way you like, and put them into presentationquality chart or graph form. You won't even have

to interrupt your train of thought. With RBASE Graphics, you keep right on using the same familiar interface. You enjoy a totally integrated solution that turns raw data into pure understanding. And now you can

express if graphically.

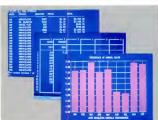
Let's take a look at the example here and see how the process works. The first screen you see is raw, un-

sorted REASE data. This is the same data REASE System Vwould use to give you the ACME Novelties weekly sales report.) All you do is tell REASE Graphics what you want, and how you want it. It goes into the database, performs the total abose, performs the total abose, performs the database. If you want a column graphable subset of the database. If you want a column graph that compares total product sales by month, all it takes is a few keystrokes.

and you've got it.
Of course, this is only
one example; with R:BASE
Graphics, using a database
to reach new levels of understanding is limited only by
the imagination.

R:BASE Graphics gives you eight standard chart or graph formats plus seven text forts, 16 colors, and up to 32 windows of split-secren displays. REASE System V SuperMath functions have also been included for precise data handling. In all, there are over 40 mathematical, trigonometric, logical and financial operations. Of course, REASE Graphics supports most popular video entire or and printers.

As you've already seen, by using R-RASE Graphics, ACME Novelties graphically identified their problem area: The Eastern Region. Now we'd like to show you another product that lets ACME review their data in a completely different way. RRASE CLOUT.*



By breaking your soles down into percentage by month, and reviewing the data graphically, it's clear that something went seriously wrong in June and July, but as yet, nobody knows where.

Even though the date for quotes and actuals are stored in different tobles, all you need to do is define what should appear on the chart. Now we see that the problem is weak sales in the Eastern Region. And come one step closer to turning a problem into a solution.



YOUR LANGUAGE. ENGLISH.

This artificial intelligence, natural language query software gives you another option. You just type your requests in plain English. CLOUT figures out exactly how to get the answers by translating common questions into computer commands.

CLOUT's natural language dictionary contains 300 commonly used words, and you can add 500 more (with definitions) per database. By adding unique definitions, you can customize CLOUT to your specific needs. Now let's go back to our example for a minute.

From RBASE Graphics, we saw the problem at ACME Novelties was weak sales in the Eastern Region. Now the question is — who's responsible? Suppose we had taught CLOUT that the name for distributors was "birghots."



A graphoring your data with CLOUT – our natural query language – you've managed to pinpoint the entire problem by hiping in one sentence. From this point on, the answer tools to be a visit to the distributors. Wholic is about the only thing CLOUT cont'd to for you.

And that, in a nutshell, is what it's like to play with R:BASE System V - along with our R:BASE Graphics and R:BASE CLOUT options. The whole process is simple, natural and intuitive.

R:BASE DATA MANAGEMENT. NOBODY GIVES YOU MORE POWER. MORE FLEXIBILITY. OR MORE WAYS TO USE IT.

Besides R:BASE System V. Graphics and CLOUT, we also offer you a number of options for ultra heavy-duty programming.

R:BASE Extended Report Writer (XRW) goes beyond the power and control provided in the R:BASE System V and R:BASE 5000 report writers. You can create complex reports with up to 250 lines per page and more than 255 character page widths, XRW also gives you the flexibility of conditional processing, substring extraction and the ability to assign over 200 variables. As a result, you can take complete command over every character on every report.

Then there's R:BASE Program Interface, a library of relocatable routines that provide access to R:BASE data for applications written in Microsoft FORTRAN C and Pascal Which gives you application development flexibility that may not be available in a database programming language. By using Program Interface, it's possible to develop a wide variety of scientific, statistical,

Finally, there's R:BASE Runtime. For developers who have created a popular application with R:BASE

and advanced business

applications.

System V. or R:BASE 5000/ 4000, this is the way to distribute it to additional users at minimum cost Each Runtime package contains all the software you need to distribute five complete applications.

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ping, it's a complete 11disk package limited only by the size of the

database you can build.Just call 1-800-547-4000. Dept. 806. In Oregon, or out-

> side the U.S., call 1-503-684-3000.

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Counies, \$145; U.S. Three-Digit ZIP
Codes, \$145; U.S. Three-Digit ZIP
Codes, \$145; U.S. Major Cities and MSAs,
\$145; U.S. Complete Set, \$395.
Requires: 394R RAM for PC, XT or AT;
600R RAM for 3720 PC; two disk drives or

Requires: 3648. RAM for PC, Al or Al; 640K RAM for 3270 PC; two disk drives or hard disk; DOS 2.0 or later. Supports: IBM CGA and EGA; Hercules monochrome/graphics card. Dot matrix, ali jet, and liser printers: plotters: Polaroid Palette, Matrix QCR, Matrix PCR, and Photometric image recorders; Video Show

Photometric image recorders; Video Show 160 presentation system.

In Short: Preclance Plus combines numeric graphing capabilities with the free-form tools of the graphics arists; graphics images may be imported and exported in several ways and customized to a high--and successful—degree. Not copy proceeded.

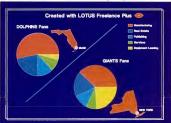
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symbol sets that furnish maps of the United States divided by county, major city, and three-digit ZIP code boundaries are available at extra cost. In addition, you can alter and resize all the symbols.

Freedance Plus Offers freehand drawing, with a mouse or digitizing tables or injust device. This way you can trace existing images, including loops or diagning and add them to any screen. While these drawings can be edited and manapies in is not immeded to be a paint progress. It doesn't offer you a variety of "brushes," for instance, nor does it give you then do for form of the progress of the progress of the profer instance, nor does it give you that has a for fourtrol over each dot (pixel) on a screen that painting programs give you.

In addition to standard number-based graphs, Freelance Plus creates the kind of text charts that are commonly used in business meetings and presentations. A sophisticated facility for building "bullet" charts enables you to design a standard format that includes favorite indentation, type

Freelance Plus allows you to edit your images once you've created the basic chart. For instonce, it's casty to review and reposition labels, titles, sext, and legends. The lines and bases cround the bases of the lines and lines. The mags below come from the package's predigined library of 550 common symbols. Freelance Plus coupts the image reproduced here to the Motrix OCR Image recorder.



style, and color settings. This chart then serves as a predefined template for the text, so that you can concentrate on the meaning of the words rather than the details of how they will be displayed.

Freelance Plus can produce graphs from numeric data that you enter directly or import from 1-2-3 or aBASE. While the program can read files stored in 1-2-3 graphic form (, PIC), a new Feature allows data stored in Symphony or 1-2-3 work-sheet files to be imported (a logical addition, since Lottus recently purchased the company that originally designed Free-laure).

To create charts from the data, you fill out an on-screen form, customized for the

desired style of graph. You indicate the information for titles, labels, legends, and data points through references to parts of worksheet files. Freelance Plus incorporates the same conventions as 1-2-3 for describing and naming ranges of data.

CONTEXT-SENSITIVE HELP The

software is particularly easy to use, especially if you're already comfortable with 1-2-3's "point-and-shoot" style menu. Clear messages about current options what to do next remain on the screen at most times. Detailed context-sensitive help is available at the push of a function key. The interface is highly interactive and intuitive. The image of the current work in progress is visible on the screen nearly all the time, with additions and modifications indicated through menu choices. The sizes and positions of graphic elements are indicated through extensive use of the cursor keys, although the alternative use of a mouse or a digitizing tablet is faster and

more flexible. Freelance Plus gives you a remarkable degree of control over each part of an image; you can break down a complex graph into its individual elements-whether it was created by drawing on the screen or generated from numbers in a 1-2-3 spreadsheet. For example, you can resize or reposition individual labels, titles, text, and legends. Moreover, you can separate and manipulate individual bars in a bar graph

or slices in a pie chart. A variety of supported output devices add to Freelance Plus's versatility. Most popular dot matrix printers and plotters are supported at their highest resolution. The package supports several film recorders. including the Polaroid Palette and Matrix PCR, allowing output to 35mm slides. The Video Show 150/160 device displays images on a video screen. You can also export images in the "Metafile" format, meaning that they can be imported by Lotus's new document-processing program, Manuscrint.

The thorough Freelance Plus documentation consists of separate installation. tutorial, and reference sections. The technical support provided by the Graphic Products Group is consistent with Lotus's high standards.

Designed as a full-featured graphics package meant to meet the needs of a wide variety of business users, Freelance Plus succeeds admirably. It may be more powerful than necessary if you're primarily interested in using graphs for analysis, but you'll find it well suited to your needs if you're familiar with-and eager to try out-the graphics arts techniques used for presentation and publication. -David Hoffman

GEM Graph

Gems are expensive, pretty, and desirable. Digital Research's GEM Graph manages two out of three: upscale price and attractiveness.



GEM Graph Digital Research Inc. 60 Garden Ct. Monterey, CA 93942 (408) 649, 3896 List Price: \$249 Options: GEM WordChart, \$149; GEM

Paint, \$199; GEM Draw Plus, \$299. Requires: 256K RAM (320K RAM for DOS 3.0 or later); two disk drives; PC. Summa, or Microsoft Mouse or SummaSketch tablet, DOS 2.0 to 3.0 Supports: IBM Monochrome Adapter, CGA, and EGA, Hercules monochrome/graphics card. Dot matrix, ink jet, and laser printers; PostScript interface; plotters. Polaroid Palette, Matrix QCR and, Matrix PCR image recorders: Video Show 160 presentation system In Short: An expensive (\$896 with all the options) program that uses a Mac-like interface to create graphs. Output should be sent to a high-quality graphics printer or an image recorder or should be displayed onscreen, but plotters are not recommended. Not copy protected.

For \$249 you get GEM Desktop, a shell that houses the applications (plus a clock. calculator, and print spooler) and GEM Graph. But to take full advantage of the GEM features you need to add GEM WordChart (\$149), GEM Paint (\$199), and GEM Draw Plus (\$299) for a grand total of \$896, plus a mouse (which is required; cost at least \$100). Once loaded, GEM Graph uses a Macintosh-style icon interface. While installation is not difficult, you'll need more than 700K bytes on a hard disk drive, and GEM Graph creates five directories off the root directory in the

You can create standard pie, line, area, bar, and 3-D bar charts with GEM Graph, as well as bar and line combinations, map charts, and symbol graphs. Data can be entered manually in the easy-to-fill-out data window or read directly from .DIF, .SYLK, .WKS, .WK1, .CSV, and .PRN

After inputting the data, you choose the gallery menu to display the graph types available. Click on the style you want, a

display window overlaps the data window, and GEM Graph proceeds to draw your chart. Toggling between the two windows is easy enough to do and any data updates are redrawn with the toggle back to the display window.

A customization tool kit appears next to the chart, showing the eight-color onscreen palette and the pattern boxes that can be used for fills. If you make a symbol chart, GEM Graph will provide 12 symbols in place of the pattern fills. If you get GEM Draw, you can create an unlimited number of your own symbols and import them into GEM Graph.

Fifteen lines of free-form text with up to 40 characters per line can be written into the chart. Placement is manual, so evenly aligning columns is rather difficult to do. A GEM Graph magnify option helps

somewhat From the data window, titles, legends, and labels are automatically placed in the chart. In addition, some of the elements can be dragged to different areas. Which ones? The only way to find out is by trial and error.

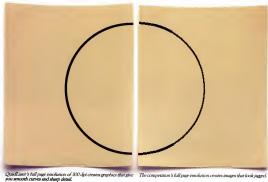
The font menu offers but a single font to work with (the upcoming Version 2 will offer two). You can also select type size, from 10 to 72 points, and type format, including normal, boldface, italic, underlined, and boxed.

Another menu contains the style options to adjust the axis scale, turn grid lines on or off, and place labels within a legend. Depending upon which chart type you choose from the gallery menu, GEM Graph offers different preference options. Another selection lets you switch from a standard graph (two dimensions) to an enhanced graph (three dimensions).

IMPRESSIVE CHARTS You can create impressive charts with GEM Graph, and output them to printers, plotters, and image recorders. Output is done from the display window without leaving the work area. GEM Graph can successfully plot only two-dimensional charts. Any highlighting that would make a graph 3-D can make plotter output totally unreadable. GEM Graph comes with two manuals.

for GEM Desktop and for Graph. Before you can adequately use GEM Graph you must be familiar with GEM Deskton be-

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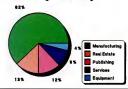
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With Digital Research's GEM Graph, our can roote impressive charts. Output is designed to go to o hip-quality interior or image or hip-quality interior or image recorder but not to o plotter. Because of a limitotion in the plotter drivers, any highlighting that would make a graph 3-D is plotted first, with the successive fills, or colors, plotted on top, making the chart totally unrecdable. This pic chost was produced on o Xeros 4020 ink jet printer.

GEM Graph

How That Will Change With the Merger



cause it is the shell that contains all of the applications. The tutorial in *Graph*'s manual is to be commended. It is short, simple, and to the point.

GEM Graph has a lot to offer; quality graphs that are easily created and modified. But GEM Graph has much going against it, now by the time you add all the modules to access the features and the modatory mouse (if you don't yet have one), you it in the \$1,000 range. Another consideration is the output. If you have a camera, device, a high-quality dot matrix, you'll be able to generate impressive output. If you rely on a plotter, forget it.—Christopher But.

GraffHopper and Graphic Decision Support System

Data Business Vision's Graffltopper is difficult to learn but fairly easy to use—once you've mastered its menu and command strategies astered its menu and command strategies as significant amount of effort (it could be a programmer's dream). Nevertheless, it offers flexibility and control of graph display and printing. Graffltopper's greatest strength, though, is its Chart Book, a collection of 101 preformatted graph types.

You control GraffHopper either by us-

ing a vertical menu or by issuing commands at a command line, and both of these methods are fairly reude. Some of the command-line prompts are particularly cryptic. But after you've learned how to use Grafflopper, you can really make it jump by using commands instead of the menus. Until you get to that point, you may find younesf struggling.

GraffHopper calls data groups "curves." You must always start with curve 2. Curve 1 is used to establish reference points. That setup can be confusing, especially for novice users. The program could use a more accessible user interface.

Luckily, GraffHopper's extensive manual includes both a quick overview and a more comprehensive walk-through that covers all the program's features and functions. The manual is generally good; one especially praiseworthy feature is the cross-reference index in the back.



Data Business
Vision Inc.
3510 Dunhill St., Suite B
San Diego, CA 92121
(619) 450-1557
List Price: Single user,
295: multiuser, \$595. Optional drivers

\$295: multiuser, \$595. Optional drivers (camera, thermal, laser, and projector) \$100 each (single user) and \$300 each (multiuser). Requires: 256K RAM, two disk drives. DOS 2.0 or later. Supports: IBM Monochrome Adapter.

Supports: 180M 3000/chrome Anapter, CQA, and EGA, Hercules moore descriptions of the control of

In Short: GraffHopper involves some added effort to use and can be difficult to learn, especially for beginners, but at includes 101 performatted graph types and a customizable command language. Not copy protected. GREL 6006.00 FADET SERVES CAND





Graphic Decision Support System Data Business Vision Inc. 3510 Dunhill St., Suite B San Diego, CA 92121 (619) 450-1557 List Price; Single user, \$1,595. Optional drivers

\$795; multiuser, \$1,595. Optional drivers (camera, thermal, laser, and projector) \$100 each (single user) and \$300 each (multiuser). Requires: 320K RAM, two disk drives, DOS 2.0 or later.

Supports: IBM Monochrome Adapter. CGA, and EGA: Hercules mone chrome/graphics card; Number Nine Revolution board: Bell & Howell Quintar Graphport Card: Bell & Howell Quintar Q1080 Card: Applied Data Systems Vector Scan 512 display adapter. Dot matrix, ink jet, laser, and thermal printers: plotters. Polaroid Palette. Matrix QCR, Matrix PCR, Lang Video Slide, RamTek 4500, Celtic VFR 2000, Image Resource Video Print image recorders; Video Show 160 presentation system: Sony RVP 460, GE Light Valve, Aquastar, Electrohome, Barco large-screen projectors. In Short: Graphic Decision Support Systems is a superset of GraffHopper. While it provides all the charting features of GraffHopper, it adds a database and a data query function. Not copy protected.

GraffHopper is steady on its feet. Try as I might, I was not able to make it crash. In each case, the program came back on its own after trying to do such things as write to an unformatted floppy disk or print to an off-line printer.

CIRCLE 668 ON READER SERVICE CARD

The program makes good use of its in Chart Book, a collection of 10 different charts to use as examples and to modify your owned and. Linging the Chart Book is the best way to use Graffitepper's you menty to use Graffitepper's you menty to use Graffitepper's you menty in the control of the collection of the collectio

GraffHopper lets you see the graph in various stages as you create it-a conve-



Since GrailHopper is both a standadore pricepe and the graphics module for Graphic Decision Support System (GDSs), which adds a point program, a dashabase, and a data query function, the features and charts produced by both packages are the same. We, therefore, reproduced the same images for both. The packages output to printers, plotters, and a wide variety of image recorders. The pic chart below was created using the

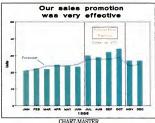


nient feature. To see what you have created so far, you can use the Go command from most menus. Once you have the graph the way you want it, you can save either a picture file of just the graph image or all of a graph's specifications.

SERIOUS DRAWBACK I had no probbem plotting Craftl/Apper graphs on the Hewlett-Packard 7470A plotter. But I couldn't manage to print them on my graphics printer. When I asked the technical-support saiff at Data Business Vision what went wrong, they told me that most of their customers use plotters or serial dot matrix printers, not graphics printers. They advised me to use the ALP Printscreen technique to dump the screen contents to a parallel printer, but even that method requires your first making some changes to the printer command file. This problem is a serious drawback for a generalal-purpose graphics program like Graff-Hopper because more users have parallel graphics printers than any other output device. The helpful support staff say they will assist all users the way they aded me, but be warned that printing on graphics printers can be trick.

If you need extra power, Data Business Vision also offers Graphic Decision Support System (GDSS), a superset of Graff-Hopper. GDSS includes all the features of GraffHopper and adds a database and a

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later

data query function, as well as a pain program. The essential command structure is the same as that of Graffhopper (since GDSS actually includes Graffhopper), and the basic charts that the two programs produce are identical. Yet the extra features of GDSS allows you significantly contained the appearance of the charts—if you tall for time beam the extra contained the programs of the charts—if you tall for time the arm the extra contained the product of the charts—if you have been as the chart of the charts—if you have been appearance of the charts—if you have been a supplier representation of your charts—if you have been a graphic representation of your databases, then GDSS is worth considering.

Otherwise, Graffletopre is best suited for intermediate to advanced users. For beginners, the effort required to master the program overhalances the convenience of the 101 performanted graph types and the command-file-customizing ability. Novices will want a program with a more accessible user interface. But if you're not a newcomer and don't mind some extra effects of the program with a more accessible user interface. But if you're not a newcomer and don't mind some extra effects of the program of the program

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Grafox, dGRAPH, and R:graph

We fooked at three Fox & Geller graphics programs for this size: *Grafox, &GRAPH.*
and *R.*graph. *Grafox, &GRAPH.*
here programs, is an easy-to-use but limited business graphics and R.*graph. and a spring, &GRAPH and R.*graph, are a bit more advanced, and each is designed to make the best use of files that are created with a certain database program. In GRAPH.*
History *GRAPH** in the program of the size of th

GRAFOX Grafox, Version 1.0, combines several features to automate the customizing of graphs. While Grafox limits you to using only a few graph types (bar, line, pie, and pie bar) and fairly simple data entry types and labels, its simple menu structure and its flexibility make it a likable program.

Installing Grafox is easy and goes without a hitch. Grafox doesn't support the EGA graphics standard, though, and will not display color without a Color/Graphics



Fox & Geller Inc.
603 Market St.
Elmwood Park, NJ
07407
(201) 794-8883
List Price: \$195
Requires: 96K RAM:
two disk drives or hard disk; DOS 1.1 or

Supports: IBM CGA. Dot matrix and ink jet printers: plotters. In Short: Grafox is a menu-driven graphics

program that also has an advanced user command mode to speed things up. It can produce only four different kinds of charts. Not copy protected.

CREAT 645 ON READER SERVICE CARD.

R

dGraph. Version 1.2 Regraph, Version 1.0B Fox & Geller Inc. 604 Market St. Elmwood Park, NJ 07407 (201) 794-8883 Ltd Peters dGR 4PM

List Price: dGRAPH, \$295; R:graph, \$295 Requires: 256K RAM; two disk drives or hard disk: DOS 2.0 or later.

Supports: IBM Monochrome Adapter and CGA; dGRAPH (not Regraph) supports Hercules monochrome/graphics eard. Dot matrix, ink jet, and laser printers; plotters In Short: Almost identical in capabilities to their predecessor, Grafox, dGRAPH and Regraph are sibling menu-driven graphics programs with an advanced user command mode to increase speed. They're a bit pricey for their functionality, but they work well, especially with the files they're designed to take advantage of. dGRAPH is designed for use with files created in dBASE III and III Plus; R:gruph, for use with files created in all versions of R:Base. Not copy protected. PICLE MIZ ON READER SERVI

Adapter in the computer—even with a fancy EGA switching graphics card.

Grafox's error-trapping system is sufficient but not faultless. Reading and writing with a disk drive with an open door or with an unformatted disk takes you to the DOS "Abort, Retry, Ignore?" prompt. Closing the door or putting in a formatted disk and then trying again recovers the program. If you Abort, however, you're sent to DOS with no files sweet. Tryine to orint with no printer attached or turned on brings a
"Printer Not Ready" message; you can re-

remetroot Ready message; you can recover by striking the Esc key. The most serious problem came from trying to print with the printer off-line. The program hung, and I needed to reboot the computer. (Grafox's descendants, dGRAPH and R:graph, were steadier on their feet: they didn't hang.)

The extensive screen images in Grafox's manual walk you through the program's functions step by step. This method uses a lot of pages but certainly simplifies

learning the program.

Grafox's bar, line, pie, and pie bar graph types each have a specific option menu that you can use to preset such functions as printing to the screen, printer, or plotter and saving the file. Single-letter menu commands select all Grafox func-

menu commands select all Grafox functions. Options for row labels include month or number formats or other data. If you choose months or numbers, the program automatically generates the text for the labels. Grafox has some fairly severe drawbacks. Numeric entries must be either

Grigox has some famy severe drawbacks. Numeric entries must be either whole numbers or have one decimal point. You can have only four data sets per graph. Legend titles for data types are restricted to nine characters each. Getting around these limitations may be more bother than it's worth.

One Grafox feature 1 especially like is the ability to print text files immediately below graphs. You cannot use Grafox to cut and passe with other programs, but it's very convenient to be able to add a paraph of explanatory information at the bottom of a chart. Another convenience is the program's ability to clone a data file, and then climinate its entries but keep the other settines.

Besides allowing you to enter data directly, Grafox can also import data from both BASIC and .DIF files. Because these processes are a bit complex, it's a good idea to know how you want your graph to end up looking before you actually start importing data. Casual users will want to think twice about using Grafox with BASIC or .DIF files.

Grafox includes an advanced command capability with which you can instruct the program to perform major functions without ever working within Grafox itself. For

In minutes, blah blah blah won't look so blah.

WEST COAST DIVISION

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SIGN-MASTER

65% of all presentation visuals are straight text.

And they typically make up the most forgettable 65% of most presentations. Because most business people treat text charts as text, when they really should be treated as graphics.

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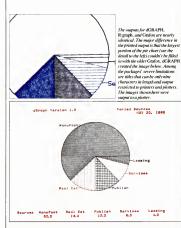
Like the other MASTER GRAPHICS™ Series packages from Ashton-Tate, including DIAGRAM-MASTER.™ MAP-MASTER™ and CHART-MASTER, SIGN-MASTER, with its automatic formatting, will give you a more professional presentation vour first time out.







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example, the command Grafox "Costs" Print will cause Grafox to load a chart file called Costs and send it directly to the printer. If you often use a lot of the same charts, this direct command mode is a valuable timesaver.

Grafox's ability to customize graphs and to automate printing to screen, printer, and plotter is admirable. At \$195 the program is a bit expensive for the simple business graphing needs it fulfills, but it is certainly worth consideration.

dGRAPH AND R:GRAPH Fox & Geller's dGRAPH and its sibling R:graph are almost identical to their predecessor, Grafox. One difference is price: dGRAPH and R.graph cost \$255 each, \$100 more than Grafor. The other noticeable differences are that dGRAPH and R.graph use BM keyboard function keys when setting graph options rather than Grafox's singulated from different formats and use a few more prompts before primiting or plotting graphs and before exiting the program. The difference between dGRAPH's and R.graph is simple: dGRAPH's and R.graph is stimple: dGRAPH's and R.graph is the simple of the dGRAPH's and R.graph's the dGRAPH's and

dGRAPH and R:graph also include a quick-reference card—missing from Grafox and much needed. Each program's manual is almost exactly the same as Gra-

fox's, from table of contents to most of the

disRAPI's and Regraph's raison d'être is to import lies directly from dibASE and Robase and to produce graphs from the data. Grafac will import only BASIC and DIF files, which neither dirRAPI to Regraph support, when you are importing dibASE and Rebase files, with disRAPI and Regraph support, when you want to lead to use and their organization by carefully following on-screen prompts. With diGAPII if you want to use a file crued with dibASE III, you must either run dibASE III's d'Converte program or rekey led tain in dibASE. II's commercial to the control of the distribution of the control of the control of the distribution of the control of the control of the distribution of the control of the control of the distribution of the control of the co

A convenient feature that both GRAPH and Ryraph share with Grafox is that they can print a Chart Definition sheet, which lists filenames, tiltsel, limits, and scaling and option settings for a given chart. This feature is especially convenient to use when referring to saved settings; it can greatly simplify the task of producing charts from monthly or other periodic reports from your database files.

dGRAPH and R.graph are expensive add-ons for dBASE III, III Plus and R.base, but if you produce similar charts periodically, their chart automation and advanced command language can quickly pay off.—Bruce Brown

o Graftime

Grattime Genigraphics Corp. is a manufacturer of

computer graphics equipment for the production of slides that ranges in price from \$30,000 to \$150,000. Now with its new program, Graftime, anyone with a PC can afford to create well-designed, high-quality graphics for output to a wide variety of devices.

Graftime has 14 chart types, including the basic graphs (line graphs, bar graphs, and so on), word charts, tabular charts, and organizational charts. You can set up a style sheet, with your choice from five palettes, three font types, drop shadow, and borders, to govern all the charts in a presentation.

The range of options may be too limited for some applications: only five palettes, no data import from other programs, not much variation in type size, and no more

It took minutes to plot this strate



DIAGRAM-MASTER

While developing a new product strategy can be a long and painful process, making it look good on paper is a piece of cake. Provided you have the right piece of software. DIAGRAM-MASTER™ from Ashton-

Tate is for generating organization charts and Gantt schedules. With a free-form drawing board that lets you visualize pretty much any situation you want.

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than eight slices in a pie chart or four sets of values per line or bar chart. Nevertheless, the charts have a certain elegance that you would expect from a descendant of Genigraphics' professional graphics systems, and it was easier to produce goodlooking charts with this package than with some of the others reviewed here-especially those that began as spreadsheet adjuncts. If your emphasis is on statistical detail, a package in the latter category may be more appropriate. If you are a nontechnical designer who wants to see the results of changes in palette quickly, an executive who wishes to use the program occasionally, or part of a graphics department for high-volume production, Graftime's features should be suitable.

Grafaine works through a menu system, using function-key commands for common operations such as preview chart and print. Picking menu choices results in on-screen forms in which you enter titles, labels, and all other information required to generate charts. You can use the Tab or cusors keys to move around and fill intinformation in any order. It was easy to follow the menus and set up our clark without even studying the manual or going through the turnoist.

There is an optional on-screen chartpreviewing function, which requires a graphics card. After we viewed our chart,

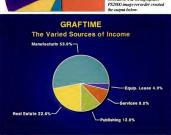
it took only a short time to redraw it onscreen since it was easy to jump from a chart to the main menu, change the settings, and redraw the chart to see the effects of the new settings. You can change data values for a chart and add or delete bars at any time.

HIGH-QUALITY OUTPUT After you are satisfied with what you see previewed on-screen, you can produce high-quality charts on a number of output devices, including most plotters, doft markit printers, HPGL devices, the QMS Lasergraphis printer, Polaroid Palette, Saumari, or Genigraphics high-end equipment. In addition, Graftime includes bullet in data communications software that lets you transmit charts from a PC to a remote console, film recorder, or data collector.

Overall, Graftime can satisfy a wide range of needs (except statistical applications): it is easy to use, is capable of high-quality output, lets you start with any view charts without a graphics card), and prints to high-end film recorders, as well as almost any dot matrix and nike ptriprite and plotter. The program incorporates the full range of chart types required by most program incorporates the full range of chart types required by most program incorporates the full range of chart types required by most program incorporates the full range of chart types required by most program incorporates the full range of chart types required by most program incorporates the full range of chart types required by the program incorporates the full range of the program incorporates the full range of the program incorporates the full range of the program incorporates the full range of the program incorporates the program incorporates the full range of the program incorporates the program incorporates the full range of the program incorporates the program incorporates



Charts produced with Graftime have o certoin elegance appropriate to a descendant of Genigraphics' professional graphics systems. It is restrively easy to create good-looking charts with this package. The package can produce output using printers, plotters, the Polorial Polette, and any of Genigraphics' image recorders. The Genigraphics PS2000 image recorder created



Create in minutes what once took 6 days.



MAP-MASTER

It used to take days to put together full-color map graphics for presentations. Which is why a lot of business people who could really use them, never even tried them.

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ages from Ashton-Tate. Like CHART-MASTER* SIGN-MASTER* and DIAGRAM-MASTER," it puts impressive graphic power into the hands of just about anyone with an IBM PC or 100% compatible.

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for counties, cities, zip codes or marketing areas. All in your choice of colors.

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GraphPlan

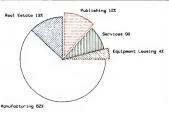
One of the oldest graphics program products reviewed in this issue, GraphPlan, from Chang Laboratories, is also probably the only program whose manuals list CP/M-80 as a supported operating system and give instructions on how to use PIP (the CP/M precursor of the MS-DOS COPY command)

How well does GraphPlan stand up to the rapid changes of the past 4 years? Well, it has a number of interesting and useful features. You enter data in a row-and-column format, and you can define rows or columns as mathematical combinations of other data elements. You can use a rule to fill a range of data elements, incrementing them by a fixed amount or a percentage, or just entering a constant in all the cells. In fact, you end up with a limited spreadsheet with which to work. A series of options gives you even more control over the printed report version of your data table.

GraphPlan also includes a variety of powerful statistical functions, including standard deviation, variance, natural logarithms, moving average, and exponential smoothing. You can sort rows to reorder the data if you wish.

The graphs the program enables you to create include the standard bar, line, and pie charts. You can choose horizontal and stacked options for the bar charts. In addi-

GraphPlan allows you to create the standard charts, including bar, line, and pie. But the package imposes real limits on producing a eraph. It imports no data, leaving you to key it all in yourself. And once the data's there, you can use one font in two sizes and display only the standard CGA four colors. The package outputs only to dot matrix and ink jet printers and to plotters (used to create the image chown1







Version 1.01 Chang Laboratories Inc. 5300 Stevens Creek San Jose, CA 95129 (800) 831-8080 (in

Calif.) (800) 972-8800 List Price: \$295

Requires: 256K RAM; one disk drive; DOS apports: IBM CGA. Dot matrix and ink jet

In Short: When it was new, GraphPlan was

probably a powerful product, but its obscure menu system and limited features relegate it to museum-piece status. Not copy protected. tion, the program gives you control over the shading patterns and colors used to cre-

ate your images. Unfortunately, though, GraphPlan sets real limits in your way when you're creating a graph. You are permitted only one title line, for instance. And the only position for the y-axis label is on top of the graph; the x-axis label can go only below the graph. You get only one font for titles and labels, and you cannot even make it bolder or italic.

YOUR AGE IS SHOWING Graph-Plan's limitations would be acceptable if it were a low-cost product that emphasized ease of use at the expense of power features. But the program's age shows through all too clearly in the user interface, coming as it does from the time when programmers could not afford to expend too many bytes on user commands and menus. As a result, GraphPlan presents you with a cryptic column of prompts down the righthand side of the screen. Some selections execute commands, while others merely change the menu to another set of prompts. After you complete an operation, you may or may not be returned to the original list.

It's a bit unfair to call these lists menus. since you must make your selection by typing the desired command's number on the command line near the top of the screen. You can actually type in any command number you wish; it does not have to appear in the list to be active. But you probably won't memorize all of Graph-Plan's more than 100 commands.

Not only is GraphPlan difficult to use in terms of its interface, it's also slow. Its poky pace is partly due to the fact that it relies on ANSI.SYS for its screen control-an old-fashioned solution, made worse by the fact that the installation instructions barely mention it. If you're installing GraphPlan on a hard disk, you'll find no help at all. Unless you are familiar with the use of ANSLSYS and its role in a CONFIG.SYS file, you might well be confronted by confusing "garbage" on your screen when you first try to run the program.

GraphPlan's documentation doesn't do much to hold up its end of the operation. It dates from 1983 and relies beavily on examples: the essence of the reference material is sometimes difficult to locate-and sometimes wrong (the tutorial section instructs you to enter values that, when I tried, the program wouldn't accept, and some prompts in the book did not match those on the screen). As evidenced in addition by its lack of tolerance for open disk drives and full floppy disks, GraphPlan is not a program for a neophyte.

With limited control over your graphs. a steep learning curve to get the hang of the command system, and little room for error in how you handle the program, Graph-Plan offers less than it demands. Not all things improve with age .- Alfred Poor

GraphStation

. .

If you're serious about getting on the graphics train, plan a stop at Software Clearing House's GraphStation. You can assemble just about any sort of graphic you wish and send it to a variety of printer and plotter destinations. With all this power comes a complex interface that's easy to use but difficult to master.

GraphStation does it all. You can create the usual bar charts, line graphs, pie charts, and combinations. It also gives you advanced features like three different curve-fitting algorithms (running average, Fourier, and polynomial best fit), text screens, free-form text on graphs, batch printing of graphs, and a slide-show mod-

ule. A complete "paint" module offers free-form and controlled line drawing. standard shapes, fill patterns, image manipulation, and even an airbrush feature. You can use the paint functions on a graph image. You can also store graphs as images and combine them on a single screen; you're limited only by the resolution of your output device and how much your audience can read on a single page at a time.

Each of these features embodies dozens of options to dress up your image. For example, for text alone, you can choose among eight fonts, change the size and spacing, and even display it at different angles, including upside down. You can also add shading. Plus you can center text or align a number of lines with a selected line.

You select all these options from a series of menus that appear on the left-hand side of the GraphStation screen. You'll want to use a mouse if you're going to use GraphStation for any length of time. Fortunately, a Mouse Systems Corp. mouse is now bundled with the program, along with another graphics program called Pizazz. which adds support for more printers. (Neither of these products was included with our review copy of the software, and



As evidenced by its lack of tolerance for open disk drives and full floppy disks. GraphPlan is not a program for a

we were unable to evaluate them.)

GraphStation has some interesting features for data import. You can use 1-2-3 worksheets or ASCII files as your source data. If you use ASCII, you display the file on the screen and highlight the items you wish to bring in as datasets. You can even display a report and pick the numbers out of the paragraphs if you want. Once you're working with the data, you can actually change a data point's value by moving the point on the graph; not only will it recalculate on the basis of a formula (imported from a spreadsheet), but you can update the values in the original spreadsheet by writing the data back out as a worksheet.

FACE THE INTERFACE The consistent user interface is easy to use if you know what you want to do or if the options are readily apparent. But a program this complex requires dozens and dozens of options for all its features, and these cannot all be present on the screen at one time. Using submenus makes sense, but to make them orderly, GraphStation waits until you select an image item (such as a bar, an axis, a title, or a legend) before it shows you'the menus that go along with that type of item. It's hard to fault a feature of a program that exhibits such care and thoughtful design, but I found the arrangement confusing and feel I would have to work with the product for a long time before I felt comfortable about where all the options are hiding. I prefer the 1-2-3 approach. where all suboptions are conveniently displayed at one time so that you don't have to



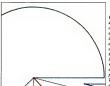


Graph Station. Version 2.0 Yale Graphics (developer) Software Clearing House Inc 771 Neeb Rd.

Cincinnati, OH 45238 (513) 451-6950 List Price: \$495 Requires: 384K RAM; hard disk: DOS 2.0 or later

Supports: 1BM CGA and EGA; Hercules monochrome/graphics card: Tecmar Graphics Master Adapter. Dot matrix, ink jet, and laser printers; plotters. In Short: GraphStation is a powerful program with a complex user interface that is almost too clever for its own good. With a mouse, patience, and plenty of practice and exploring, you will be able to produce outstanding graphics with this program. Not copy protected

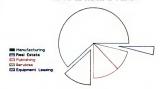
CIRCLE 640 CN READER SERVICE CAR



With GraphStation, you can dress up your image as we did her by centering text and changing its size and angle. You can also select individual pic segments for exploding, moving each one to any desired position. Unfortunately, the graph shown below lost much in the translation because the version we reviewed hast limited compatibility with the HP ATMA potter used on evaluations. The near version will correct this deficiency.

GraphStation

The Varied Sources of Income



guess about what you can do next.

Perhaps my reaction to CraphStation's user interface would have been different if its manuals were better. The 400-page ref-cence manual has a decent index and sufficient examples in most cases, but it sidf-inclut to navigate through without table as landmarks. The tutorial manual is more than 130 pages long and does a fair job of introducing you to the program is philosophy and some of its features. Explaining most properties of the program of the pro

The program's wonderful output is worth the effort required to get to know all the options. For plotting, GraphStation offers you three speeds. You can get a quick draft with rough letters and no shading, or a perfect image in extremely fine resolu-

With its good-quality output and its many features, GraphStation goes the distance. But it's not an express trip: be prepared to spend some time mastering the possibilities.—Alfred Poor

Graphwriter

Lotus Pevelopment Corp.'s Graphwriter is an ex- ellent tool for anyone who makes presentations frequently or for a department that needs to prepare all of the materials for a group of presenters. It is a comprehensive graphics package that comes with 28 basic chart formats and a special format with which you can produce presentation materials such as slides and overhead transparencies. And if you want to be even more creative, you can use Lotus's Freelance to add, edit, and rotate graphics ele-

Graphwriter is an easy-to-use, practical program designed with insights into what a presentation needs: in addition to offering a wide variety of charts, including Gantt charts, organization charts, bubble charts, table charts, and a "word chart" format that enables you to design a complete set of presentation materials, it lets you build a style sheet to ensure consistency among the charts. The package also comes with a set of blank forms that can be used to collect data for charts and information such as paper size, plot area, and graph orientation. The forms also have areas for name and phone number, date submitted, and date due, thereby serving as job sheets in a production environment in which the person requesting the charts is not the same as the one using Graphwriter to produce

The program opens with a main menu of six clearly stated options: Change to Another Format, Enter or Change Chart Data.





Lons Development Corp. 55 Cambridge Pkwy. Cambridge, MA 02142 (800) 248-8002

(800) 248-8002 List Price: \$495 Requires: 256K RAM; two disk drives: DOS 2.0 or later.

Supports: IBM Monochrome Adapter and CGA: Hercules monochrome/graphics card. Dor matrix and ink; per primters: HP Laserjet; plotters. Polaroid Palette, Matrix QCR, and Matrix PCR image recorders.

In Short: An easy-to-use package that offers

a wide variety of chart formats, including "word charts," for complete presentation materials. Graphwriter produces practical and effective charts that can be enhanced through a related program called Freelance

through a related program called Free Not copy protected.

Attention Lotus users:

Write easier, write faster. Right in 1-2-3.

Lotus users must be the most loval. most patient people in the world . many of you continue to use 1-2-3 for writing memos and reports. You tap the / Range Justify command to rearrange text. Your [F2] edit key is worn an eighth of an inch shorter than the rest. It's not pretty, but it works. Well, your patience just paid off. Introducing 4WORD, The Add-In Word Processor™ for 1-2-3. If you've ever written a memo using Lotus, you're going

to love it. Processing, Built-In.

4WORD is unlike anything you've seen. It's not a macro. It's not even a standalone Lotus add-on. 4WORD is full-featured word processing software that integrates into 1-2-3 itself. It's one of the first products available that uses the new Advanced Add-In technology from Lotus, So it actually functions as part of 1-2-3 (the way word processing works inside Symphony). That means when you want to write a memo, just shift into 4WORD with a single keystroke. Right in the middle of your spreadsheet. You never have to stop, store and exit 1-2-3 again.

Imagine: You're running a "what-if" budget analvsis in 1-2-3 and you come up with a better solution. Ouick, fire off a memo to your department manager before you lose your train of thought. Without 4WORD you'd have to save your spreadsheet, exit 1-2-3 and

load a word processor. With 4WORD, just move the cursor to an unused column, press a key and you're there. Now you can type away. With features of

the most powerful word processors. Better letters. On-screen. 4WORD gives you automatic word

wrap with on-screen justification. Block copy and move. Bold, italics, underline, global search and replace, tabs, automatic re-align, margins, and more. All right on your WORD screen. All without leaving 1-2-3. You can even create sophisticated form let-

ters, and merge them with the spreadsheet's database. Automatically, Then print with the 1-2-3/Print command. And, the whole process can be controlled by a 1-2-3 macro.

Now let's talk integration. Imagine the memoagain. And imagine this: To demonstrate your solution, you need to include spreadsheet numbers. Can 4WORD do that? You bet, Just tap / Integrate (that's a new 4WORD command), move the cursor across the range of numbers and zap. Your

memo is connected to your spreadsheet. And · Not copy-protected the numbers appear in Requires PC/MS-DOS 2.0 or later and an IBM PC version of Lotus 1-2-3 the memo right where you want them. If you change numbers in the spreadsheet, the memo changes too. We call this "hot links." And the first time you write a report with tables, exhibits and

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Change Chart Style, Print Data, Store Chart, and Plot Chart. The options branch out into 11 submenus; it's easy to find your way around, with most of the menu selections giving you a series of screen prompts or questions that you answer in sequence. The package also comes with a 16-page booklet that includes a map of the menus, along with many other quick tips and reference of the package and the property of the package and the property of th

Graphwriter is easy to get into and use; we arrely had to refer to the comprehensive 300-page reference manual. We did find one flaw, however: there's no easy way of going back one step if you change your mind or make an error. We generally had to go through the full list of prompts associated with a command if we wanted to go

back and change specific entries.

Graphwriter allows you to type data furteely into it or to pull in figures to the pull respect of the pull respect of the pull recharts you can enter up to three heading lines at the top of the chart, up to three charts you can enter up to three heading lines at the bottom, up to three comment lines are the post for chart, up to three the pull relines inside the chart area, and a legal to the right. Although you have a choice of whether or not to enter the text, the whether or not to enter the text, the is as andard and where you enter text cannot be channed.

TYPE DEPENDS ON OUTPUT There are different typefaces available for the text, which vary depending on your output device. For example, with plotters there

Graphwriter is a comprehensive

28 basic chart formats. The

package provides different typefaces for the text, and you can

olso specify any text size by

a wide range of printers ond

plotters and outputs to several

entering the type font and a size

percentore. Graphwriter prints to

graphics package that comes with

are eight fonts plus 11 colors. You can, specify type size of up to 100 millimeters and the type face for any text simply by giving the type font and a size percentage. You also have a choice of palettes, fill patterns, line types, marker types, chart sizes, and borders. You can store and use specific style files for all the charts in a set.

ic style files for all the charts in a set. You can store charts in two ways (as individual data and as composed charts) and both ways. If you store chart data, you can call it up at any time and change the data, you can call it up at any time and change the data, you can style of the chart; if you store as conduct print a series of composed files, but you cannot change a composed file. But you cannot change a composed file. But processing means that you can build large number of charts and print them all at many processing means that you can build large number of charts and them though an insure processor.

Once you have specified the data and text for a chart, you can plot it on-screen before sending it to a printer. Graphwriter prints to a wide range of printers and plotters, including Epson dot matrix printers, the HP Laserje, and HP plotters, as well as to the Polaroid Palette and other image recorders for slides.

corders for sides.

Overall, Graphwriter is a flexible and efficient presentation tool, most satisfable for those who don't mind working on text screens during most of the charting processing it is easy to generate or charge all list of presentation materials.

List of presentation materials.

The charge all list of presentation materials.

image recorders, including the Maris CR Read for create the Chart shown here. Created with LOTUS Graphwriter The Varied Sources of Income Manufacturing Equipment Leasing Services Real Estate Publishing

GSS-Chart

Working with GSS-Chart, from Graphe Software Systems, it cauchy like working with an Apple Macintoni. Vou choose functions by pointing to icose, symbols on the acreen that represent various operators. GSS-Chart has several flary features, including a paint program and an on-seren text writer that allows you customize and comment charts freely. The icon-selection user interface is GSS-Chart's greatest attribute—a powerful feature that by itself may very well be turn that by itself may very well be supported to the control of t

FACT FILE



GSS-Chart, Version 1.0 Graphic Software Systems Inc. 9590 Southwest Gemini Dr. Beaverton, OR 97005 (503) 641-2200 List Price: \$295.

Optional modules: GSS Device Drivers t, 2, 3, 11, 12, 13, 14, S50 each. Requirers: 512K RAM: two disk drives: DOS 2.1 or later. Supports: IBM CGA. EGA, and PGA; Hercules monochrome/graphics card. Dot

Hercules monochromolgraphics card. Dot matrix, in kjet, and Isser printers: plotters. Polaroid Palette, and Cal'Comp Samurai image recorders. In Short: GSS-Chart is a fine implementation of Macintosh-style iconselection-driven software with many fine features. But currently fleaved by Guity

implementation of Maciniosh-style iconselection-driven software with many fine features, but currently flawed by faulty printer and plotter drivers. Easier to use and with a few more features, but not as fast as the similar CSS-Plottalk. Not copy protected. GROSS BRIGHT SERVICE CAPO

the program's \$295 price tag.

You control all operations and selection features in GSS-Chart by is on selection. For example, writing text is represented by apencil tip, erasing by a pencil eraser, and output by a picture of a printer. You select a function or option by positioning the graphics cursor (which books like an overgrown plus sign) on the icoayymbol and hitting the Enter key or the mouse button if you're using one.

It's fun to use GSS-Chart. I quickly found myself moving from feature to function to operation without worrying about syntax or spelling. At those times when you absolutely do have to key in information, such as when entering data or filenames, the cursor changes from the graphics cursor style to a blinking block cursor. When you finish with the data or filename, the graphics cursor returns.

Besides a marvelous implementation of icon selection, CSS-Chart has several other top-notch features. There is a paint program that lets you put arrows, circles, rectangles, or lines wherever you'd like on your chart. You can choose colors from a changeable on-screen color ralette. Simi-

GSS-Chart's pains pragram lets you put arrows, etc., and lines arrowhere rectangles, and lines arrowhere to the set and the set of the set and the set of the set and the set

GSS-CHART 1.0 The Varied Sources of Income G96 Mendedurin We Equip Lastin We Review Brown 1996 Revi

larly, you can use the text annotation feature to insert lines of text anywhere in your chart; you can also dynamically choose the type font, size, and the location of the "box" of lines of text. You can build some pretty fancy charts using the drawing and text annotation features.

GSS-Chart has a helpful calculator function that you can use to perform operations with individual data items or sets of data. There are also several numeric operions such as accumulation, smoothing, and absolute value built right into the program. These functions can be extremely useful in converting raw data for various reporting purposes.

lar icon point-and-shoot technique, you will do well to carefully follow the manual's instructions at first. The program includes on-line help, but it's a bit sketchy; you will want to refer to the manual for your first few charts.

EASY INSTALLATION GSS-Chart is memory hungry, requiring at least 512K bytes. Installation is simple via a GSS-Device Driver disk that rewrites your CON-FIG. SYS file to include the drivers that GSS-Chart insists on. Clear information screens guide you through installation, but you have to pay careful attention. Even though there is a separate installation disk and documentation, some necessary information, some necessary information.

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started

mation is lacking. I had to call customer support to make the program work properly with my printer and plotter. When I called, however, the customer-support staff was pleasant and answered questions

GSS-Chart is not exactly bulletproof. When I tried to write to an unformatted disk or to a disk drive with the door open. or to read under the same conditions. I received the disk failure "Abort, Retry, Ignore?" message. When the given condition was corrected the program came back successfully, but it would be better if it error-trapped for those problems. If I tried to write to a nonexistent subdirectory, that didn't fool the program; GSS-Chart indicated that it couldn't "connect to" the directory. Sending to off-line or nonexistent printers hung the program until the printer was turned on or brought on-line. There were worse results with writing to a full disk. No message told me the disk was full. Subsequently looking at the directory of the full disk revealed that the filename was in the directory, but that the file itself was only 0 bytes long. You would assume that your data was saved, then exit to find your file gone. GSS should improve the program's error-trapping.

The error-handling ability is the same as that of GSS-Chart's sibling, GSS-Plottalk, GSS-Chart is easier to use and offers several extra features (a rudimentary paint program, the ability to display four charts on-screen, and .DIF and .SYLK file import), while Plottalk is faster. Both cost the same

GSS-Chart is the answer for those who want to create and modify graphics by icon selection. The program is easy to use once you've learned its organization. -Bruce Brown

GSS-Plottalk

If icon-controlled programs like GSS-Chart are for yuppies, then GSS-Plottalk is for Crocodile Dundee. It's tough, fast, and gets the job done with no foolishness. Graphic Software Systems' GSS-Plottalk is entirely command driven. You have to learn its language, but once you do, this may be the fastest graphics program going. At \$295, the same as its more effete sibling GSS-Chart, Plottalk may well appeal to power-hungry computer users more than

Chart. At first GSS-Plottalk doesn't seem easy to use. Once you've installed the program with the GSS Device Driver disk, loading GSS-Plottalk confronts you with a lonely ">" at the top-left-hand comer of your screen. The realization that you have to tell it everything to do, rather than choose from menus, sinks in, and you may start to wish you'd bought GSS-Chart. Don't despair: while GSS-Plottalk has many com-

The language interpreter in GSS-Plottalk is quite liberal. Many commands have synonyms, such as Draw and Go. You can also issue commands as sentences: "Please make the y axis type percent" or abbreviated, "y tick %"; both accomplish the same thing. A final command form is the imperative: "Frame the chart." This diversity of language acceptance encourages you to experiment with commands and lessens some of the concern about ex-

act syntax. A three-lesson tutorial booklet walks

ness. By the time I finished the tutorial, I felt ready to use all of the program's features-a fine measure of effectiveness for any tutorial. mands, you need less than a dozen to get

EASY WINNER PC Magazine has no test for how quickly a chart can be built and displayed on the screen, but if it did, GSS-Plottalk would be one of the winners. While other programs show you opening screens and require you to step through menus. GSS-Plottalk takes your commands as quickly as you can type them and displays your chart on the screen whenever you type Draw or Go.

you through creating several charts key-

stroke by keystroke. I was quickly

charmed by this program's lenience with

language and pleased by its responsive-

Anytime you want to review the commands used in creating a given chart, you simply type the command List and your commands are displayed on the screen. just like a program listing. When you save a GSS-Plottalk chart you actually save an ASCII file of commands, which means you can also use your word processor to indirectly create and control GSS-Plottalk

GSS-Plottalk did not do too well on our error-trapping tests, the same as GSS-Chart. Nonfatal halts occur if you try to read from or write to open disk drives or unformatted disks. There is no problem writing to a nonexistent subdirectory. Sending to off-line or turned-off printers hangs you up only until you correct the faulty condition. The greatest potential problem, as with GSS-Chart, occurs if you write to a disk that's full or doesn't have enough room. The documentation states that this condition will be caught; however, when I tried it the program wrote the file title to the disk directory but the contents were not there. Nothing on the screen gave the slightest indication that my data wasn't on the disk

The GSS-Plottalk user manual is basically a reference manual, but a good one nevertheless. Each command is explained completely, with suitable examples provided. A quick-reference card is also included to further aid users.

GSS-Plottalk includes many options for charts. You can select hatching patterns. colors, fonts, positioning points, frames,



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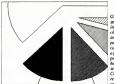
List Price: \$295, Optional modules: GSS Device Drivers, Vols. 1, 2, 3, 11, 12, 13, 14, \$50 each. Requires: 256K RAM; two disk drives;

DOS 2.1 or later. Supports: IBM CGA, EGA, and PGA; Hercules monochrome/graphics card. Dot

matrix, ink jet, and laser printers; plotters. Polaroid Palette and CalComp Samurai In Short: An ultrafast, command-driven (no menus, no icons) graphics program that gives

the user who is willing to learn its language a good deal of control over charts. Charts can be created and modified very quickly. This program is somewhat harder to learn than its teon-driven cousin, GSS-Chart. Not copy protected. IRCLE 650 ON READER SERVICE CARE

PC MAGAZINE # MARCHIO. 1987



GSS-Plottalk's greatest appeal is speed: a command-driven interface lets you breeze through chart creation. To add visual interest, you can select hack hing patterns, colors, and forst. You can also explode any or all slices in a pie and express numbers as percentages. The image shown here was coupted by the Magic Corp service bureau using the Ceko CFR 4000, a bliehe and image recorder for commercial applications.

GSS-PLOTTALK 1.0 The Varied Sources of Income

62% Manufacturing

4% Equipment Lease

9% Services

13% Real Estate 12% Publishing

messages, and outlines, among other choices. You also can display multiple graph types on a single axis.

GSS-Plotath's greatest appeal is speed. The language is forgiving and fun to use, and the rapidity with which you can built and display charts a big draw. GSS-Plotath properties of the propert

Harvard Presentation Graphics

Anyone who's ever shrugged and said, 'Gee, I'd sure like to do graphics, but it's just too complicated." should be shanghaied into sitting down with Harvard Presentation Graphics from Software Publishing Corp. Creating a graph is a quick, completely menudriven process. The final result, in both the quality and the diversity of the charts, is equal to, if not greater than, many packages with all sorts of complicated ortions and shenaniae molicated ortion and shenaniae may

plicated options and shenanigans.

Harvard Presentation Graphics asks
you to select the type of chart you wish to

create and then presents a user-fill-in-the blank template. Choices are text, pie, bar/ line, area, hi-low, and organizational charts, and each offers a fair amount of flexibility. For instance, you can create columns in text slides. Because you select a chart format first, then input the data, your data is maried to one specific kind of chart, but because data entry is so easy it hardly matters.

The manual adequately discusses design considerations for presenting data in a graphic format. Graphs are easy to create using Harvard Presentation Graphics' straightforward menu selections. To create your charts, you fill out a row/column chart in which you specify titles, labels, and enter data. Pie charts require one additional form, and bar and line charts require two additional forms in which you choose other options specific to these particular graphs. For example, you can link (illustrate a relationship between two pies or a pie and column), specify color or pattern fills, or create a 3-D effect. You can select overlapped or stacked bars, display grid lines, and specify legend placement, axis increments, and other options.

rements, and other options.

The program incorporates consistent





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List Price: \$395 Requires: 256K RAM, 384K RAM with VDI device; two disk drives or hard disk; DOS 2.0 or later.

Supports: IBM CCA and EIA; Heroules monochromic graphs ics and. Do matrible is card. Do matrible is card. Do matrible is card. Do matrible is card. The matrible is card. The matrible potents: Pollut-Origin interface; potents: Pollut-Origin interface; potents: Pollut-Origin interface; pollut-Origin interface; pollut-Origin interface; pollut-Origin interface; pollut-Origin interface; with output to laser printers, the Pollution interface; with output to laser printers, the Pollution interface; with output to laser printers, the Pollution interface; po



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Lightning's good enough to make programmers and users cheer, executives of other softwere companies weep," says Jim Seymour of PC Week, Sold separately, Turbo Lightning retails for \$99.951

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use of the PC's function keys. F1's context-sensitive help offers detailed explanations about menu selections, and the F2 key commands the program to draw a chart on-screen for you to preview. Besides using the various data form templates, you can select F7 to adjust text sizes (each front has a number of predefined sizes) and F5 to specify font attributes, such as italic or boldface.

WELL-PLANNED OPTIONS One of the handiest options is the X Data Type Overlay menu. You can indicate the type of x-axis data you plan to graph (day, year, quarter, and so forth) and specify an increment for the data. Harvard Presentation Graphics automatically fills in the values. Graphing data across months or years is accomplished in seconds, with no typographical errors. Moreover, the program can graph cumulative data as well as suppress a series of data. For example, I eliminated 1980's figures from the graph without eliminating the data for that year.

Perhaps the weakest part of the program is its annotation capabilities. A primition MacPaint-like or PC-Paint-like interface allows you to enhance the chart by selecting various icons from the annotations menu. The enhancements include arrows, lines, boxes, and floating text. The annotation process limits you to modifying, copying, or moving annotations within the

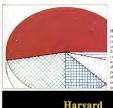
graph; you cannot edit any portion of the graph itself. The keyboard control over the annotation process is somewhat crude and limited.

Harvard Presentation Graphics prodicks substantial date export and import facilities. An easy-to-use data exchange procedure facilities data transfer the program supports Software Publishing Corp. sexcellen into of easy-to-use business software, the PFS series. You can exsport charts to a PSS-Wire document of the property of the property of the property of the protocological protocologica

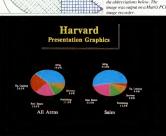
In addition to its provess as a chartmaker, Harvard Persentation Graphics creates attractive presentations with a module, called Persentation Master, that you can use to design and play back sequences of graphs and charts. You can quence and adjust the time delays. The Practice Card feature lest you type notes or comments that correspond to the presenttion. Since you can store charts in directories separate from Presentation Master, presentations are easy to organize and presentations are easy to organize and

To climinae agonizing waist for out, Harward Presentation Graphics of fees three different output qualities waff allows you to print quickly, standard produces higher quality but slowly, and high-yould be produced to the produce higher quality is used for your final draft, ward Presentation Graphics offers a more management of the produced presentation of the produced higher and the produced highter and the produced higher and the produced higher and the pro

can't specify their coordinates on the page. In exchange for simplicity, Harvard Presentation Graphics, at times, snakes of flexibility. Rigis you achoice of five basic fonts with certain preformanted attributes and presidenced text sizes. While you can specify fill, boldface, tails, or underline for text titles, you must go to the configuration menu to select a different font. You cannot mix fonts within a single graph. The program chopped the labels on cause they couldn't fit my text line. The package lacks a symbol library and free must have been described in the provides from drawing causelilities, and it provides



Harvard Presentation Graphics controls the plotter beautifully, creating smooth curves like those visible in the detail to the left. Unfortunately, the program chopped the labels in phe pie chart to hits because they wouldn't fil in the space allotted for text on the peakage's data import form, hence the abbreviations helow. The image was output on a Matrix PCR



you make changes.

only a modicum of annotation capabilities.

Harvard Presentation Graphics is a good reminder that simple programs don't necessarily have to mean simple results. The charts are uniformly high in quality, and the list of included features reflects excellent tastes and judgment. If you need a single, easy-to-use package for multiple charting purposes, I highly recommend Harvard Presentation Graphics.

—Robin Raskin

KeyChart

Softley Software Products' KeyChart is a menu-driven business and scientific graphics program that gives users terrific graphics program that gives users terrific control of chart layout and composition. KeyChart's screen preview feature makes the program stand out from the crowd. When you add its data importing method and other features, you have a very powerful and flexible graphics creation tool. At 375 for the plotter version and 314 for 575 for the plotter version and 314 for KeyChart is not inexpensive, but it delivers full value for the rice. KeyChart's installation is automatically run from a batch file. The System Settings option on the main menu lets you step through screens to select your plotter (or printer with the printer version), video board and data path (disk drive and subdirectory). It's easy to reconfigure later on if

You have a lot of control with Key-Chart, but for beginners it may appear that you have too many decisions to make. Before you start entering data in Key-Chart, you are confronted with a "fixed screen." which you can fill with information about your chart. Actually you can rely on Key-Chart's default settings most of the time. All you really have to lell it is the number of variables and the number of observations. Unfortunately, KeyChart gives the impression of being harder to use than it is.

KeyChart's user manual is very complete, if a bit dry. The overview tutorial is just that: a quick look at the major functions

KeyChart passed PC Magazine's robustness tests just fine, never blowing away data or leaving the program as long as we corrected the offending error or hit the Esc key.

The program comes with sample charts that can be modified to fit your own data and needs. Because you can look at all the settings that created the sample charts, you can use those charts as models.



KeyChant is a powerful graphics tool that gives you lots of control. For instance, you can explode any or all of a pic chart's slices. You can also list data tiems as percentages. You can specify up to 99 floating tiltes and size and place them independently. The package drives a wide variety of printers, and film recorders, such as the HP 3510 sused to output the

image below.





KeyChart, Version 4.0 Softkey Software Products Inc. 260 Richmond St. West, #300 Toronto, Ontario Canada M5V 1W5 (416) 598-5033

List Price: \$149, printer version: \$375, plotter version. Optional modules: Batch Processing Modules for use with the HP 7550 plotter and the Zeta 8 plotter, \$225. Requires: 128K RAM; one disk drive; DOS 2,0 or later.

Supports: IBM Monochrome Adapter, CGA, and EGA; Hereules monochrome/graphics card. Dot matrix, ink jet, and laser printers: plotters. Polatorid Palette, Matrix QCR, Matrix PCR, Photometric, and HP 75 10A image recorders.

In Short: A powerful business and scientific

graphics program that includes a dynamic graph editor, easy data importing capability, and excellent preview capabilities. Separate versions are required for plotter or dot matrix/laser printer output, a costly inconvenience. Not copy protected. ORCLE BY ON PEACEP SERVICE CAPO KEYCHART PRESENTATION GRAPHICS
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ATI CP SOLL BUDGER PROCRAMS POODS BUFFOR DESCRIPTION OF PROCRAMS SOLD BUFFOR DESCRIPTION OF PROCRAMS - TRANNIO FOWER PROCRAMS BUFFOR DESCRIPTION OF PROCRAMS - TRAINIO FOWER PROCRAMS - BUFFOR DESCRIPTION OF PROCRAMS - TAINIO FOWER PROCRAMS - Tainion OF PROCRAMS - Support DESCRIPTION OF PROCRAMS - Tainion OF PROCRAMS - Support DESCRIPTION OF PROCRAMS - Tainion OF PROCRAMS - Support DESCRIPTION OF PROCRAMS - Tainion OF PROCRAMS - Tai	26. 33. 49. 26. 37. 37.
All educational programs listed are copy-protected except where noted.	
Barron's	
Computer SAT	
Spelicopter (ages 6 to eduit)	
*Algebra 1,2,3, or 4 Stone & Associates (recs. CGA)	22.
* -My Letters, Numbers, Words (ages 1 to 5).	27
* Kids Stuff (eges 3 to 8)	27
True BASIC, Inc NCP	
* Calculus	32.
* PreCelculus. * Trigonometry.	32.
* Trigonometry	32.
RECREATIONAL	

All recreational programs listed are copy-protected except where noted

Blue Chip		
* - Managing for	Success (Ame	vican Dream).
* - Millionaire		
Electronic A	rts NCP	
-Starflight (reg	s. CGA)	
Haydan Soft	twars	
		ess progrem)
* -Infocom		
	the Witness	
Leather God	doccoo	Hitchhiker's (2)

Moonmist

Zork II

Invisiclues (hint b										е	Π	ж	١	٠	. 6.	
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PREVIEWING YOUR CHARTS Perhaps the most impressive feature of Key-Charr is its preview facility. Once you have told the program all you want about your chart, you can select Preview from the main menu. You next see another menu from which you can choose one of three options: Full-Screen Preview, Layout Preview, or Font Preview.

Full-screen preview shows at a glance what your draft chart looks like. If you don't like what you see, go to the layout preview, in which you can dynamically change the position and size of various items. The chart preview function is a great

timesaver and a superb chart editing tool. KeyChart will import data from some other programs directly. You can also crate an ASCII test file with a word processive to the programs of the superbolic test o

You can specify up to 99 floating titles for any chart. Floating titles can be sized and placed independently, or they can be locked to previous titles and be made to maintain their relative positioning, even if the first of a series of floating titles is moved around. Floating titles can also be used to create text charts or signs using KeyChart's forms and sizing capabilities.

KeyChart has a batch processing mode, in which you can specify multiple copies of one chart, multiple charts, or a mixture. To save time in printing or plotting frequently used charts, you can create a DOS batch file that tells KeyChart which charts and how many of each should be printed.

KeyChari includes logarithmic functions and multiple regression types. You can specify regression varieties at the time with the preview function. You can choose from linear regression, exponential regression, power repression, and logarithmic regression plottings to observe data relationships.

The program could stand a few improvements. The multitude of menus reducs the need to refer to the manual, but hey also get in the way. I wish there were a way to go directly to a command mode and bypass the menus. A related issue is speed going from menu to menu: it's not about with an 8-MH/E AT, but I was noticeably slow with an 8088 processor. I'd also prefer to have one version work with both printers and plotters rather than have to but two copies of the program.

KeyCharr is a tremendous business and scientific graphics program. While its features may be more than you need if you create charts only occasionally, those who produce many charts and can use KeyCharr's dynamic editing ability are well advised to take a close look at this program.—Bruce Brown

Nimbus

Nimbus is a paradox. Its creators at Media Cybernetics Celarly put careful design, clever programming, and many hours of work into developing the product—yet they seem to have blinked on some basic points. The program performs varied business graphics tasks, often with interesting added features, but these benefits don't make up for a general lack of polish and for some hidden flaws that seriously hamper the program's usefulness.

On the face of it, there's a lot to like about Nimbus. It does bur charts (including 3-D graphs), line graphs, pies, area graphs, scatter plots, and high-low diagrams. It can produce text charts, either free form or based on predefined formats. It also has 18 different available fonts, which you can make bolder if you choose.

Another useful extra is a data file editor that the typo duplicate data from one chart and save it as a set in another chart (or in the same chart). You can also combine data sets using addition, subtraction, multiplication, and division. This makes short work of creating complex analyses of related information sets.

Nimbus supports 22 different video graphics adapters, some of which I never even knew existed. It works with 16 different pointing devices, including keyboards, mice, trackballs, and digitizing pads. It also supports a handful of plotters, and it knows how to talk to laser printers, ink jet printers, and even the Apple Imagewriter.

So what's wrong? Plenty. Take data import. Mimbus accepts only data elements (no titles or headings) and only in .DIF or ASCII format. What's more, the ASCII format isn't very useful, since it requires nonstandard formatting. Yet the .DIF import has one dandy feature: you can "notate" data to bring in the information by row or by column, no matter which way vour spreadsheet was desirent.

The data-import features point to a general problem with Nimbar: it does one or two things very well, then spoils it by failing at something simple. For example, you can type up to three lines of free-form text to be included on a chart, and you can indicate where you want them to appear. But you can't control the size of these letters (unlike almost every other instance of text on the chart), and the large size provided by the program will almost certainly oblit-

erate part of your graph.
You can only print using as many colors as are available on your display screen, so if you're using a color/graphics adapter in highest resolution, you'll get only one col-



Nimbus, Version 2.0 Media Cybernetics Inc. 8484 Georgia Ave... #200 Silver Spring. MD 20910 (301) 495-3305

20910 (301) 495-3305 List Price: \$195 Requires: 512K RAM, two disk drives,

Supports: IBM CCIA and EGA; Herodies memochromic graphs: card J. Number Nine Revolution bound, AT &T Diplay Enhancement Bound, Video Diplay Adapter; Termar de March Video Diplay Adapter; Termar de March Video Diplay Adapter; Termar de March Video, Conceptables Nocle 12 and 40; MAI, Conceptables Nocle 12 and 40; MAI, Conceptables Nocle 12 and 40; March 20 and II, Palente Mater, Quadwarent: STE Graphic Pikes III. Science PC 640; Sigma Designs: Color 400; Tieng Laibs EVA, EVA 640; Moscockerome bound Den matrix, EMA 640; Mos

has lots of features but some restrictive limitations and inconsistencies that make it less attractive. Not copy protected.

ORCLE 542 OF READERS SERVER CARD

or on your printout. You can improve on this by using the Virtual Page feature (which requires 640K bytes), but that's not easy to figure out from the documentation. In fact, the configuration program defaults to not using the Virtual Page feature. Also, the program's text chart feature is a separate module, so if you want to include text chart material on the same page as your graph, you must print one first, reinsert the paper, and then print the other. Be sure to save your data before you switch; it won't stay in memory.

LITTLE FLAWS Nimbus has lots of other little flaws. You are supposed to move from field to field in the specification

screens using the Tab and Return keys, but I found that the cursor control keys also work. You'd better not use them, however-they don't behave consistently, and once I hung up my keyboard by pressing them instead of the "proper" keys. In tests for robustness, the program generally relied on DOS to trap disk errors and performed acceptably on printer errors. An annoying surprise cropped up when I encountered a read error while printing a graph. In response to the DOS "Abort, Retry, Ignore" on-screen prompt, I pressed the R key. The DOS message ap-

peared as part of the printout! In a program full of weak links, the documentation is one of the weakest. More than a third of its 100 pages are singlescreen shots of sample graphs or menus. The tutorial, a mere three pages long, is based on a single sample file that provides only a cursory introduction to some of the features. It offers no instruction on finding the menu for pie charts, which is hidden (I found it only by stumbling across it), and it says nothing about text charts at all. The reference section has no examples illustrating the effects of the different options. And to cap it off, there is no index.

It's hard to get worked up about a program like this. Nimbus does a fair job of printing adequate graphs, but its many flaws and restrictions make it a chore to use.-Alfred Poor

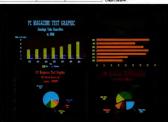
Perspective

Perspective, from Three D Graphics, is one of the most innovative packages to come along in years. It lets you create 32 kinds of three-dimensional graphs from data, each of which you can rotate on all three axes and view from 16 different angles. The package offers a wide array of two-dimensional graph types as well. Best of all, the package is very easy to use.

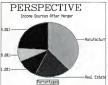
In the 3-D format, you have many options for dressing up your graphics. You can fill your screen with graphs, which you can size to fit any space. You can enlarge or reduce title and subtitle text, as well as



of problems. It produces a wide variety of charts and allows you to but up to four of them on a single page, It has 18 fonts, which you can make bolder if you choose. And it supports a wide variety of adapters and output devices. including the HP 7510A image recorder used to create the pie chart below







Perspective's strong suit is 3-D graphics. The package lets you turn your data into 32 kinds of 3-D graphs, which you can dress up by resting titles or dragging them around the screen. However, you can't make a 3-D pic chart, only bar and line graphs. The current version dato limit you to printer and plotter output. The image below was printed with an HP



add boldface or slant it. You can choose from a mind-boggling assortment of 180 background patterns and fills. You can add borders and remove frames. And you can even drag 3-D titles around on the screen until they appear exactly where you want them to be.

Exciting as are Perspective's 3-D graphs from a design standpoint, however, they are limited in that they are all variations on line and bar chart formats.

The 2-D graphs include various line and bar charts, such as vertical and horizontal percent bars, vertical and horizontal bar clusters, stacked bars, and both absolute and relative multiple-line graphs. You can also make solar coordinate and relative

stacked-area charts, absolute multiple-area charts, spectral mapped cell graphs, as well as single and multiple pie charts.

Unfortunately, the amount of customization you can do in a 2-D file is limited. You can't change fonts or move titles unless you combine 2-D and 3-D files on the same screen; to do this you freeze the first image on the screen using a menu option, then add the second file.

Output is also less than optimal. Until the color version comes along, you'll have to settle for black-and-white graphs printed on your dot matrix or HP Laserjet printer, although you do have the option to change print density and margins. There's no support for film recorders or plotters.

EASE AND ENDOMENT Perspective is exceptionally says to use. You can create graphs without ever reading the manual simply choose the options listed on the screen. To access must of these choices, you use the first five function keys, which program's menu levels, and, if you've made changes to the graph, it redisplays the graph. Luckily, small representations of these keys labeled with their current and the screen is the screen of the screen and the screen are screen as the screen are screen as the screen and the screen and the screen are screen as the screen as the screen are screen as the screen are screen as the screen as the screen are screen as the screen

Installation is a matter of using a simple batch file that creates separate subdirectories on your hard disk for the program files, graph formats, data, and completed picture files. Error-trapping is excellent throughout the various operations.

Data entry and import are also accomplished with ease using the Data Manager screen. A small menu at the top of that screen allows you to specify cell coordinates for titles, row and column headings, data labels, and the data itself. In other words, you can select data to be graphed in ranges, much as you might from a 1-2-3 file. Perspective can import data in ASCII. DIF; and SYIK formats. And once you tell the program the name of the file of the program the name of the file determines its type. It then imports not only the data, but also the title, subtitle, and column and row labels.

This is a fast, flexible program that can be run and enjoyed by any level of user. The graphics output is guaranteed to impress its audience. At \$295, it's a barpain.—Marvin Bryan

PFS:Graph

Software Publishing Corp. has been a major contender in the microcomputer world since the early 1980s. The reason for its success? Primarily because its PFS: series meets the need for easy-to-use, practical programs. PFS: Graph is no exception.

For \$140, you get a basic graphics program that 's easy to learn and use. PFS: Graph's simple menus offer clear one-step choices of the program's most significant functions and features.

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key continues a process, and the Esc key takes you back to the main menu, as in the other packages in the series, which use same control keys.

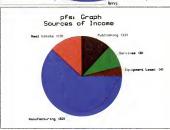
You can use PFS:Graph to build bar. line, and pie charts. You can also modify the basic formats somewhat to create area charts and stacked bar charts. PFS:Graph also allows you to mix bar and line graphs in the same chart. Bar charts are limited to 36 data points, and pie charts can have no more than eight segments. You cannot explode pie segments.

To create charts, you can enter new data or import data from other programs, including those that either use or can export files in .SYLK or .DIF formats. In addition, you can easily use data from PFS:File or PFS:Plan, and you can send a graph to be incomprated into a PFS:Write document. Once your data is in PFS:Graph-either imported data or data entered in PFS:Graph itself-it's easy to go back and forth between the data table and the graph display to make changes to the data and to view the results of the changes in the graphs.

Entering data, labels, titles, and legends is easy. One particularly useful feature is a selection of four formats for displaying dates by day, month, quarter, or year. When you have created a graph, you can save either the whole chart with all its



If you've ever used another PFS: series package, you'll feel right at home with PFS:Graph. It lets you build basic bar, line, and pie charts plus a few extras like area and stacked bar charts. You have a choice of colors, shades, or hatching patterns to differentiate between data items. You can output to printers and plotters (used to create the output shown



CT FILE



PFS:Graph Version B:01 Software Publishing Corp 1901 Landings Dr. Mountain View, CA

(415) 962-8910 Requires: 128K RAM; one disk drive; DOS 2.0 or later Supports: IBM Monochrome Adapter and CGA; Hercules monochrome/graphics card.

Dot matrix, ink jet, and laser printers; In Short: PFS: Graph is a plain-vanilla

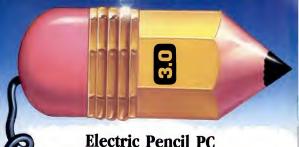
graphics package that is exceptionally easy to use. Copy protected.
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data and other settings or save just the screen image as a picture file, which you can call up for later printing or display. You cannot then modify the picture file further, but if you save the whole chart with its settings, you can change data or other settings later. The PFS: Graph Get/Save/Remove menu screen shows filenames in an indicated subdirectory-a very convenient facility when you want to save a new file and don't remember the names of current files on the disk.

CRASH-PROOF The program is virtually indestructible: Nothing crashes it, despite all the nasty tricks I tried. Unfortunately, though, PFS:Graph is still copy protected. Software Publishing Corp. has removed copy protection from the rest of its older product line and also from its new releases, but the PFS: series still limits you to one floppy disk backup and five hard disk drive installations

Software Publishing Corp. has long had the reputation for clear, instructive manuals. The documentation for PFS: Graph is no exception. The manual leads you through processes screen by screen in a combination tutorial and reference format

PFS:Graph is best suited for those with limited needs for simple graphics who want a product that can give them what they need-without a steep learning curve. price tag, and work load.-Bruce Brown



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20

Picture Perfect

Picture Perfect. from Computer Support Copp., is one of those wonderful programs that are easy to start with and difficult to outgrow. If you need to create basic charts and graphs, Picture Perfect will accommodate you, making your job fairly easy ne to create complex graphs that present difficult problems other packages can't cope with. Picture Perfect will work just as well, and just as easily.

well, and just as easily.

The program is really a collection of five separate modules, each of which handles a different type of graph: vertical bar, horizontal bar, pie chart, line, and combined bar-line. With all the options within these categories, you're sure to find a format that will present your data in its best

Switching among modules is a little awkward; the loading delays will discourage you from changing back and forth too often. You can read data from one chart format to another, however, and so transforming a bar graph to a line graph is not difficult.

All modules use a consistent command

FILE

and menu structure. You use the first eight function keys to make elections from the menu, and the options are consistently displayed at the bottom on the screen in eight highlighted boxes. Some selections call uporter submenus, some execute consumants, and some toggle different feature for and on. For example, you use for and on. For example, you use for a potter. Another function lets you route the data to a disk file instead, so that you can print the files later using a batch file.

THE CUSTOM TOUCH You can use the system defaults to design your chart, or you can take control of every little detail. Picture Perfect gives you a choice of 13 different typefaces (with more available as an option) and normal or boldface print. These characters are based on shape definitions instead of bit-mapped images, and you can enlarge or reduce them at will; you specify how large the largest type should be and how small the smallest type should be, and Picture Perfect adjusts the intermediate sizes accordingly.

The program gives you a choice of 54 different shading patterns, plus 3 extra ones for pie charts based on radial and circular lines. You specify which pen will be used to plot the sections; if your plotter has fewer pens, Picture Perfect will stop and ask you to change the pens.

Axis scales are sized automatically, but



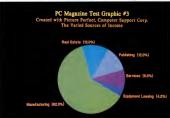
Picture Perfect gives you a wide range of options for customizing your graphs. For instance, you can reduce or enlarge type sizes: the program gives you a choice of 54 shading patterns, plus 3 extra ones especially for pic hearts; and you can float test anywhere. The package has divers for printers, plotters, and image recorders. The chart below was outnou usine to

HP 7510A image recorder.



Palette, HP 7510, and Polaroid Palette Plus image recorders.

In Short: Petrure Perfect is a midpriced product with top-end feduruse. While is to copy protected and plots its graphs slowly on a plain 8088 machine; these problems are more than offset by its power and flexibility. Copy protected.



you can override the setting if you want. If a bar exceeds the top limit, the plot "breaks" the bar to show you the problem. You can control the placement of the bar values; in a window in the bar, on top, at the bottom, or not at all. You can also have two different y-axis scales and specify which bars are to be plotted against the left or the right.



If you must create complex graphs that present problems other packages can't cope with, Picture Perfect will

Picture Perfect goes even further in helping you customize your graphs. You can put up to nine free-floating blocks of text anywhere you wish on the chart. Typographic "bullets" can readily make your lists more attractive. (If you wanted to, you could probably make some fancy text charts just by using these blocks and

not showing the graphs.) Picture Perfect cannot put two graphs on the same screen, except through the use of the Bar-Line option. You do have total control, however, of the size and the placement of a graph on the paper. As a result, you can put many different types of graphs

My major complaint is that the program is copy protected and you must use a key disk. You can install (and uninstall) it on a hard disk, though, and then use the managing program to search all available disk drives for Picture Perfect modules, so you can spread your modules over different subdirectories and disk drives if you wish.

Another possible drawback is that the program can be fairly slow while plotting the graph to the screen because it must calculate everything, including the individual text characters. You can forgive the delay once you see the detail and precision that result from all this work. Fortunately, you can also speed up performance significantly by using a math coprocessor (8087 for PCs or XTs, 80287 for ATs).

Picture Perfect's manual is more of a tutorial for each section than a reference, but the program's user interface is so convenient that you really don't need to consult a reference too often. If you have any question about a menu choice or option, you can simply press the F7 key and get a full screen of detailed, context-sensitive help. The manual lists all the menu options and the different shading options that are available, which are handy to have as a quick reference. The program also includes sample files handy for learning more about the range of capabilities.

If you need to produce serious graphs of professional quality, then give Picture Perfect a good long look. It has all the power you'll need, whether you're buying your first graphics package or a replacement for one that you've outgrown. -Alfred Poor

Slide Expert

Slide Expert, as you might guess, is a business graphics package that produces 35mm color slides. It's simple: you use the program to design your charts, then you send the files via modem to one of five Autographix imaging centers. They will return high-resolution, professional-quality slides or 8- by 10-inch transparencies within I day.

The graphs you can create are restricted to a number of predefined formats, including pie, bar, line, and area charts, although a "custom" chart option allows more design freedom. Other formats are used to create word and tabular charts. When you're entering data, an on-screen diagram serves to remind you of the names of the components used in each graph style, and where they will be placed. For example, when you're creating a line graph, the diagram shows each axis and indicates how the final image will display titles, labels, and legends.

A set of glossy color "guidelines" included with the program ensures that slides will have a harmonious palette. And a section of the manual is devoted specifically





Slide Exper Autographix Inc. 100 Fifth Ave Waltham, MA 02154 (617) 890-8559 List Price: \$249 Requires: 256K RAM: two disk drives or hard

disk: DOS 2 flor later Supports: IBM CGA and EGA: Hercules monochrome/graphics card. Dot matrix printers; HP Laserjet. Haves Smartmoden 1200 (or Hayes compatible); COM port 1 or COM port 2

in Short: A straightforward busines graphics program for producing high-quality output without the need to invest in expensive equipment, Slide Expert supplies structured graph formats that include most common styles. Images are created and previewed on a standard IBM PC graphics screen or printer, and a built-in communications module allows easy uploading of image files to a service center where 35mm slides are generated and shipped back to the user. Copy protected. CIPCLE 655 ON READER SERVICE CA

to good design techniques. Although you can always find a way to make a mess of your graphics designs, Slide Expert does its best to keep your graphics pleasing to the eve.

Slide Expert is menu driven and easy to use, with help windows on the screen most of the time. The menus lead you through the steps needed to create a chart from text or numbers. The easiest way to create Slide Expert graphs is by keying in data, titles, and labels.

CONVOLUTED CONVERSION AIthough the package includes a module to convert 1-2-3 and Symphony data, the process is convoluted. You must first load the 1-2-3 software, then retrieve a special Autographix worksheet that comes with the program. You must fill in this worksheet with your data, either by typing it in or through the use of formulas that access other areas of the worksheet. The resulting worksheet is saved to disk and is now in a format that Slide Expert can read.

No matter which procedure you enter data with, you can edit the basic compo-



Slide Expert allows you to design charts on your PC, then send the files vio modem to one of five Autographic imaging centers, which is how the slide below was created. The center used of Celco R5000 image recorder. You can make o printout to preview your charts, but the package does not support plotters. A nice extro is that the documentation provides

Autographix SLIDE EXPERT Varied Sources of Income From New York Manufacturing Res Edited Publishing Services Equipment Leasing

nents of graphs to some degree. Editing involves making a series of menu choices and typing in changes when prompted. When all changes are complete. Sidde Expert redraws the image on the screen. You can modify the tot of labels, legends, and titles, as well as alter numeric data. However, your ability to move or resize these individual elements relative to each other is restricted.

A chart type called "custom" is the only one that allows you to enter and reposition lines, rectangles, and text freely. You can add symbols from the library, which includes a variety of borders, maps, and backgrounds, to existing charts, but you cannot alter or scale them. Several

charts, including custom charts, can be combined into one image through use of the editing facility.

the conting actinity and soft and actinity and soft and actinity and actinity and actinity and actinity and actinity and actinity princes, as well as to the HPL actific, thriften couput is prince to a soft actinity intended for previewing an image. The monitor is just aguide to what the finished film image will look like. On the screen, images are displayed in COA resolution, with only four colors. Text may be represented simply by a rectangle if it is to small to be distinguished properly at the control of the soft actinity and act

piki maging centers, which produce extremely high resolution slides and transparencies with a wide range of colors. After you've created and approved your graphs, you transmit them to one of the imaging centers, sing the included commuration of the color of the color of the color munications software is very simple to use. You enter shapping and credit card information, as well as a list of desired image lifes off-line. Then you press a key and the program dails an imaging center, sends all the necessity date, and then hangs up the

The normal tumaround time for slides is 1 day. Converting a file to either a slide or a full-color overhead transparency costs about \$10.

Autographix's documentation is well assured to the structured; it is geared to the novice user. Most of the program's features are covered in a tutorial style chapter called "Learning." To make it easier to visualize what the finished, full-color slide will look like, the manual shows high-quality color and style samples. Color reproductions of the library of 72 predefined symbols are also included.

Slide Expert is appropriate for your business if you require top-quality presentation graphics but cannot invest in expensive output equipment, especially if your need for slide production is minimal or sporadic, or a trained graphics staff is nonexistent. (If your graphics needs grow, Autographix can provide full-function workstations and a networking version of its software called AGX 35, which costs \$895 per copy.) Slide Expert is also well suited to users who might be unsure of their artistic abilities and who would welcome the many predefined graph formats and color schemes. The user who sticks to Stide Expert's suggestions is likely to produce the most successful images.

--David Hoffman SlideWrite Plus

Load up Advanced Graphics Software's SlideWrite Plus from its 'two unprotected disks, fill out the configuration screen, and you are on your way. Like a pair of prewashed jeans, the program is a comfortable fit; you ease into creating whatever charts and graphs you want. SlideWrite

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DOS 2.0 or later.

Supports: IBM CGA and EGA: Hercules
monochrome/graphics card. Dot matrix, ink
jet, and laser printers: plotters. HP 7510 image recorder.

In Short: An emochrome program with inter-

In Short: An easy-to-use program with intermediate power, SildeWrite Plas should meet the needs of many users. Its simple text, drawing, and picture features make it that much more attractive. Not copy protected. GPG15 floor MR AGESTERMIC CAPD.

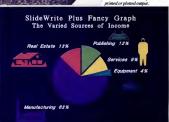
Plus has some minor limitations, but for most intermediate-level users, its features justify the \$345 price tag.

One of Stitelwire Plus's best qualities is its ease of the. It's menu driven, using the first eight function keys, and you may not have to refer to the manual at all once you complete the 30-page tutorial. All blocks at the bottom of the scene. A number of the submenu options are toggle settings, with their status shown below the label. In instances in which you have many choices available, such as storing or recalling a fife, a touch of a key brings a direction of the control of the status of the sta

Data entry is smooth and casy, Stifewire Place Issy on imput a range of dates simply by entering the first in the series, You can specify the x axis as either a set of discrete elements (such as years or produses) or as a numeric range. Veiwing the same data in different graph formats is simple enough to do—just change one option and look at the results. The program offers the usual mis of graph designs: horizontal and vertical bars, stacked bars, linezontal and vertical bars, suched bars, lineof whose wedges can be exploded). You can also mis bar, line, and scatter graphs on a single chart, although you cannot All and the state of

Slide Write Plus gives you a sufficient rather than a generous store of options for creating handsome charts with little difficulty. For instance, you can use pictographs to add punch to a standard pie chart and shade or color them for additional impact. You can also size images to fit a given space. The chart below was output using on HP 75100 image

recorder. You can also produce



place more than one chart on a single print-

SlideWrite Plus offers only five different fonts, but they are clean, attractive, and available in either roman or italic. You have complete control over shading and colors of the different elements of the charts. Although you don't get many options to choose from, you get more than enough to create a handsome chart with very little difficulty.

WORTHWHILE TOOL A few extra features turn this acceptable program into a worthwhile business tool. The text chart module lets you create "word charts" and signs for presentations. It can also automatically expand or reduce the text for optimum fit. With a draw module, you can create lines freehand on the screen and add both lext and predefined figures to your chart or graph. The figures include shadowed and drop-shadowed boxes, circles, flowchart shapes, circuit diagram elements, and pictographs of people and objects. You can quickly dress up a simple graph, create a flowchart, or develop an oreanization diagram.

SlideWrite Plus even addresses one of the most annoying problems of graphics programs, the length of time needed for printing the results. With SlideWrite Plus, you can "batch" the output procedure. First, you create the images that you want and save them to the disk. Then, you call up a batch process screen, enter the names of the images to print or plot, start it, and walk away. If you're plotting, you'll lahave to change paper and, perhaps, pers, but you won't have to keep entering the mares of the files to plot. And, should something go wrong, as happened on the last two entries on one of my print runs, it's



SlideWrite Plus is easy to use. It's menu driven, and you may not have to refer to the manual at all once you complete the tutorial.

easy to eliminate the names of the files that went correctly and reprint only the ones that failed.

SlideWrite Plus does heve some weak points, most notably in its data import. It promises 1-2-3 import, but ectually it can bring in only a worksheet that already has a graph defined in it. The ASCII import, too, has fairly restrictive expectations about the format of the import file data. (Advenced Graphics is now shipping SlideWrite Plus, Version 1.1, which provides more flexibility in data import by reading 1-2-3 and Symphony spreadsheets and using the data directly, but we were unable to test this feature.) Other limitations of this program include the absence of dual vertical axes and 3-D bars. And in our tests for robustness. SlideWrite Plus trailed some other packages. Occasionally it would get hung up when it encountered printer problems.

For most users, however, SlideWrite Plus's shortcomings will seem minor. The program is easy to use, has sufficient power for most graphics needs, and comes with many features to add zip to your presentations. It's an attractive choice.

-Alfred Poor



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rt runs on IBM* PCs and compatibles And support IBM EGA and other graphs; cards, as well as the little desires from Folgorial, Headers Parkard, IBM and other

Energraphics

Energraphics, from Enertronics Research, is a top-class business graphics program. It allows you to easily import existing. DIF files and provides a wide choice of graph types along with a reasonable selection of colors, type fonts, symbols, and other illustrative material.

You enter the program through the opening menu, which gives you a choice of four functions: Graph, Draw, Support, and Utilities. The first is, as you might suspect, the main graphing program: the second is a drawing utility which, unfortunately, is not attached in any way to Graph; the third enables you to convert. DIF files governs your hardware configuration.

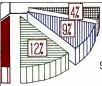
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Once in the Graph module, you find your way through Energraphica's various options by means of a helpful series of ments that appear on the upper-right-hand comer of the secret. Separate functions allow you to save a chart, read a previously created chart into memory, draw a chart on-sereen or on puper, or create a totally new graphic.

EDIT SCREENS Energraphics sets up its graphics using a series of three "fill-in" edit screens, most of which have preset default values. The first is Create/Edit Data, which allows you to choose a chart type, then accepts your data along with identifying legends and data labels (if you have picked up the data from a .DIF file, it will

appear here). Create Edit Scales allows you to determine the scale values and, in the case of bar chairs, the labels for the horizontal and vortical axes. Create Edit Text then creates room for a three-line title and one line for a copyright or other identification for the graph on the lower-righthand comer of the illustration. Incidentiaby, you can also access all of these screen from your men.

Once all your basic data is in place, you can then choose the Draw Chart option. Here, you choose such options as resolution, frame type, two or three dimensions, scoring, multiple or stack bars, overlapping, horizontal or vertical, numbered axis, display value, and chart size. Once you have selected all of these factors, the



The pic clast below was suspine unling the Video Slow (60) preceduring system of your vasal on claborate preceduring, you run see Energyaphics. Consonate Graphic colors and let from you count loo and be ref, frames, and may if 90 pre-stored images. However, while Energyaphics coners with a drawing programs that you cause to revening thirmsions, you causant see this drawing faritity to dreex up young expulse.





GRAPHICS SOFTWARE ON DISPLAY. Dedicated Charting Software, \$500 and Above

program will draw the chart on-screen.

If you want a more elaborate presentation, the Energraphics Customize Graphiics option less you change your graph's colors and text fonts; you can also add str, frames, and any of 99 prestored images. Your chart is exhibited on-screen and escaparate item is accompanied on-screen by a small yellow box by placing your cursor in the box and "picking up" that item, you can then after and/or move most of the chart's elements.

chart seements.

Energraphic allows you to merge up to four graphs onto one chart through a separate function that links them together in the on-screen format that you specify. You cannot customize a "merged" chart; if you want any extra text for your merged charts, you must create it as a separate "execthear." However, if you go back and change one of the original charts, those changes will appear in the merged product.

Unfortunately, the charting package does not take advantage of one of the program's nicest features: its Draw facility, or This is a basic drawing program that his is a basic drawing program that occur to the create illustrations; however, any graphics that you create in the New program cannot be accessed by the Graph function, and vice weran. The only function, and vice weran. The only when you can use Draw to decorate a graph is in their shared symbol library—you cannot create a totally new symbol.

However, one problem does not bad software make. Euergraphics as it now stands is an excellent graphics program; if the graphics and drawing facilities are ever linked, the package will be hard to beat.—Barbura Krasnoff

The Gallery Collection

The Gallery Collection, from Hewlettpeakard Co., is a good choice for the corporate computing professional who seeks a set of professional whighly flexible chart formatis—and who has a lot of time on his hands. Though its memi-driven interface should be simple to use and though it can gree you beautiful results, you won't muster them grant members of the control of the

The collection consists of a straight | graphics program and a drawing accessory. The graphics segment, Charting Gallery, is three separate programs for bar, line, and pie charts, each with its own set of menus to learn. There is no command line: all options are in the menus, which are accessed through function keys. While this means you don't have to memorize any commands, you do have to memorize how to find them-there are 67 command options on 12 menus for bar charts alone. To make a chart, you must travel through a network of unintuitive and easily forgotten function key paths. I found myself constantly relearning the program.

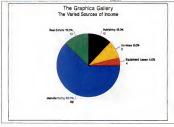
I can't think of any program as complex and involving as Charting Gallery that of-

fers no form of on-screen help-except Charting Gallery. In most cases, the prompt line tells you what to do next. If you get stuck in the middle of an operation. however, you must either experiment, turn to the reference manual, or call technical support. At one point, I blanked out the subtitle for one of my charts and could find no menu selection to bring it back. I couldn't even highlight the subtitle area, although I had done so earlier. After a long quest through the reference manual, I stumbled onto an answer. I had changed the size of the screen text to large, the only size that won't allow a subtitle. Changing the size back to medium solved the problem. Fine-but a help message might have

saved me an hour.



The Gallery Collection consists of two programs. A straight graphics program called the Charling Gallery and a drawing acressory. The graph below was created with the graphics program and output saing a HP 3010 minger recorder. The charling programs after predictions the lifestile charling programs after predictions to the charling programs of predictions of the programs for the complete to use. The package conflict to use. The package for but, line, and pic charls, and each has its own set of menus to acch has its own set of menus to



These problems are vexing because the set of Charing Gallery is rather easy to use. Data entry, whether direct or import of, is simple. The program imports ASCII and DIF files, as well as 4-2-3 and Symptony worksheets, straight fine the proposition of the property of the control of the property of the prope

substitution and configuration also come easily; a wonderfully clear set of colorful screens guides you through every step. To select a difver, you simply most the cursor through a list of choices, pressing a function key to install your highlight ed choice. Once the drivers are installed, the choices appear when you want to print. Bravo, HP, for making the configuration

process so simple!

Charting Gallery recovers extremely well from errors such as an open disk drive door, a full disk, a nonexistent file, and so on. In all my testing, the program never got hung up. This time, credit goes partly



To make a chart with Gallery Collection, you must travel through a network of unintuitive and easily forgotten function key

paths.

to the menu-driven interface. If you haven't installed a plotter driver, for example, the name of the plotter won't appear on the function-key menu for output. There's no way to pick the wrong device.

The documentation, although of professional quality, is generous with reference material but stingy on the tutorial side. Still, the well-written reference manual spells out most charting operations in detail. Vendor support for the product appears to be excellent.

SPRUCING UP Charting Gallery contains a wealth of special features, including a handy file-manager screen. The most special feature of all, however, is Drawing Gallery, included for freehand graphics production and for sprucing up the appearance of your charts. Drawing Gallery gives access to many text enhancements regarding fonts, type size, and placement. With it, you can create organizational maps, flowcharts, diagrams, schedules, and forms. And you can get rather fancy, adding thematic graphics, lines, arrows, boxes, symbols, shapes, text, and much more to your charts. More than 600 images come with the basic package; additional portfolios, each with about 200 to 300 images, cost an average of \$95 apiece.

The Gallery Collection lists for \$695, largely due to the inclusion of Drawing Gallery. For high-end users, that price certainly represents a value, but anyone interested only in basic graphics might want to consider Charting Gallery alone, priced at \$295. powerful software with the potential for beautiful results. Unfortunately, getting to those results is no simple task. If the excessive menus and their awkwardly placed selections could be rearranged, I would not heighten deplications—even for beginners. As it is, you will have to work hard to master this package.—Phil Wiswell

GrafTalk

You can get anything you want with Software Solutions' Graffalk, but you may have to work at it. Dual y-axis graphs, text charts, free-floating text, scatter charts with regression lines, and a host of other basic and exotic features make Graffalk a serious program for those willling to send

the time required to master its intrincies. The program has been around for quie a number of years and is now in its fourth unigar release. Originally published by the Redding Group, at was recently acquired by Software Solutions, publishers of the database program DataEase. According to company representatives, Software Solutions is working on a new version of the recipital capabilities while imposing the user interface. Since it is due out at about the time this review should aponear in





Hewlett Packard Co. 3410 Central Expy. Santa Clara, CA 95051 (408) 749-9500 List Price: 5695; Charring Gallery atone, 5395. Modules: Office Activi-

ties Portfolio, \$95: Chemical Petrochemical Portfolio, \$150. HP Draw Figures Portfolio,

Requires: 384K RAM, two disk drives; DOS 2.0 or later. Supports: IBM Monochrome Adapter.

CGA, and EGA; Hercules monochromo/graphics card. Dot matter, mit jet, and liner printers; pittoris; HP 7510A film recorder. In Short: This package, combining basis graphics with a frechand capability, can produce spectacular, high-quality hard copy. A portly organized, contisuage ment interface and a lock of on-screen help, however, seriously detruct from the program's usefulness. Not copy protected.





Graffafk, Version 4.1 Software Solutions Inc. 12 Cambridge Dr. Trumbull, CT 06611 (800) 243-5123 (203) 374-8000 List Price: 5695 Requires: 256K RAM:

two disk drives; DOS 2.0 or later. Supports: IBM Monochrome Adapter, CGA, and EGA: Hercules monochrome/graphics card; Teemar Graphics Master Adapter. Dost mines and laser printers; ploners. Martix QCR image

Becomer.

In Short: A powerful program with a confusing assortment of user interfaces, manuals, and options, GrafTalk is only for the hardy. A new, casset-to-use version is slated for release soon. Not copy protected, ORCL 668 UPP ACRE BENDEC ORD.

Overall, The Gallery Collection is very

GRAPHICS SOFTWARE ON DISPLAY: Dedicated Charting Software, \$500 and Above

print, you may want to check out the new version if this one has the kind of features that interest you.

And Graffalk does have many features. It starts of with many of the basics but charts (horizontal, vertical, clustered, and stacked), jee charts, line charts, scatter charts, light-low gruphs, and area charts. It then goes on to offer some more unasterior paraquantities (one as an absolute and the other as a relative measure) for a number of observations. Craffalk also offers regression lines and table charts that show your data. You can position your bottom: a arts and the contract of the charts of the charts of your can be the chart of the charts of the your can be the chart of the charts of the your can be the chart of the charts of the charts of the your can be the chart of the charts of the position of the charts of the charts of the charts of the charts of the position of the charts of the charts of the charts of the charts of the position of the charts of the charts of the charts of the charts of the position of the charts of the charts of the charts of the charts of the the charts of the the charts of the the charts of the

Graffalk also produces text charts. Its sketch feature enables you to draw geometric shapes and freehand lines, so you can create drawings and organization charts. Twelve different fonts are available, and you can size each to suit your needs, plus choose either roman or talks style. You can send the text in any direction, including angles. Also, Graffalk lets you combine different tyees of charts on a

single plot. There is a slide-show feature in Graffalk, and you can even create custom menus and prompts.

The program produces fairly attractive graphs quickly. It plotted fast in our test with an HP 7470A, and the characters it produced were a little angular but accent-

at pro



GrafTalk gives you control over a wide range of graphic design elements, but hey can be complicated to master. Fortunately, the program can create acceptable graphs like the one shown below using the default settings. The subtitute on this graph is free-floating text; you can

Pie Chart: Graffalk The Varied Sources of Income Ax 9x 12x Manufacturing Bruitsent Lessing Bruitsent Lessing Bruitsent Lessing

A GRAPHING PROGRAM LANGUAGE Graffals in its elemental form is really agapting program language. You create graphs by defining data sets and then stringing together. Sets common the sets of the stringing together selection of the sets of the sets

(a DATA
1 2 3 4
(a END
TITLE "A Pie Chart"
LEGEND AUTO "TV" "Mags"
"News" "BBoards"

PLOT PIE R1

A simple area chart can require a command file of 30 lines or more. Graffalk includes a simple editor that you use to create the command files, but it is not much like any popular editor and takes some getting used to before you can become proficient in its use.

GrafTalk's problem is its user-intimidating interface. How intimidating is it? Before you even get to the four distribution disks, you encounter a mass of documentation: three small pamphlets, a thicker booklet, and three thick wire-bound manuals. The primer booklet shows you how to start the program and draw a simple graph using the three different modes. You then turn to the Sampler to see a series of graphs and a description of how they were created, or to the Reader, which provides a topical overview of the different GrafTalk features, or to the Encyclopedia, a reference manual of the 160 (yes, 160) different commands in alphabetical order.

Fortunately, Graffalk's makers took pity on its users and created not one, but wo different front ends to the command-driven system. Its menu mode lets you select options for different types of operations, such as entering data, setting legends and titles, and choosing the plotting device. This option limits access to only some of the rougean's now its own.

The prompt mode, on the other hand, asks you a series of questions about the graph you wish to create and then it draws it for you. You then have the option of



PROBLEM: There's just no easy way to move from one software program to another.

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Hard to believe, but some people are happy with just one kind of PC software. Well, this is not a product for them.

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grams fighting for control. With Software Carousel, you can have as many accessories and utilities ontap as you want. Just load different ones in different Carousel partitions. Since they can't see each other.

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changing the settings, which leads you to a menu that is similar but not identical to the menu mode menu. I found foraffalk assiest to use with the prompt mode, but I still had to "duck out" and use the command line to perform some operations, such as deleting rows or columns from my data

Graffalk is weak in data import: it will import 1:2-3 data from worksheet files but not titles or axis labels. Also, it doesn't show much intelligence in its use of pens on a two-pen plotter. It will prompt you to switch pens as needed, but it will require you to run through all the required pens twice since it prints the entire graph before it orints any of the lesend.

The program has poor prompts and error-trapping, too. When entering legend captions arranged in a vertical list on the



Impressionist
does have
the features
necessary
to create
complex,
superb-looking
charts, but
mastering this
program is a
nightmare.

screen, for example, it prompts you to press cursor keys to move from field to field. The Cursor Down key would seem to be a logical choice, but instead it behaves erratically. You must either press Enter twice or use the Cursor Right key to move to the next caption field. When I entered a long title for a graph and then tried to draw the graph, I was told that there was not enough room to print a legend caption. I tried using smaller type for the legends, but that did not help. When I removed the legends entirely, I was told that "6" was too long to plot on the graph. These redherring error messages never referred to the graph title itself, and the problem went away as soon as I shortened it. And Graf-Talk is a somewhat fragile program, relying on DOS to trap some disk errors.

Customer support is good, though, which is unusual for newly acquired products. And the person I spoke to was knowledgeable about the quirks and pitfalls you might encounter when using the program.

Overall, GrafTalk's many powerly features make it interesting, but they still don't balance out its intimidating interface and its documentation problems. If Software Solutions made GrafTalk easy to use (like its DataEase, which has a menu-driven interface), hen the program might well be worth considering. My advice wait for the new release.—Affixed Poor

Graphics Express

There's more to Graphics Express, from Bell & Howell Co., than meets the eye. Behind the friendly-looking opening menu hides a marmoth program that supports digitizing tablets and sophisticated output hardware; it also offers powerful features for generating and customizing almost any

kind of business graph or word chart. The package is based on a Zenographics program called Mirage, which was first copyrighted in 1981. One of the primary purposes of the Bell & Howell version is to offer suppose for its own \$5,000 film recorder, the Color Digital Imager IV. The program retains for \$1,200 and is appropriate for the corporate heavy user who may be a supposed to the composed program of the comp

Graphics Express will import ASCII, .DIF, and .SYLK files. The only major type of graph it cannot generate is the organization chart.

Although Gruphice Express can run on a floppy disk system, you'd have to do too much disk swapping with this 1.8-megical-byte program to make that svery person requires a proper process of the process of the state of the state

dividually as DOS command lines. Here you can specify devices such as the Video Show 160 and the Polaroid Palette, also thermal, ink jet, and laser printers.

The opening menu, labeled Level I, has nonthreasting options like Make a Graph and Tutorials. However, Level 2 has layer upon layer of menus intended for experienced computer users, as well as a command language. You access this level by pressing Shift-P8, an option that does not appear on the Level I menu. The drop's in to shirtly notive for consolating users the contract of the

PROGRAM STRUCTURE: An intricate program structure has its advantages. In Level 2 you can plot muttiple graphs on the same page, display three axes on a bar chart with different seales if you like, perform linear regression, show negative values in a different color, and even maintain a database. You can select most functions





Graphics Express
Bell & Howell Co.
Quintar Division
411 Amapola Ave.
Torrance, CA 90501
(800) 233-5231
List Price: \$1,200;

Volumes I and 2, 595 each, Reguleries, 844 R.AM; two dols drives or hand disk, DOS 2 of a rather GA. Hercules Supported HIM CGA, and F. Hercules Supported HIM CGA, and F. Herwild Genphics Master for Lemma Complice Master for Howell Genphics Master for Howell Genphics Challer Howell Genphics Challer for martix, nike and luser persentence plotten. Polaroid Palette, Martix Corphopter and Polaroid Palette, Martix CGR, Martis PER, and Photomeric image recorders. Video Stown 160 presentation proceedings of the Polaroid Palette Challer Deptin Imager 19 virtil device.

In Short: Graphics Express is a manyfeatured package most attractive to experienced computer users who need support for sophisticated output devices; it's difficult to learn their produces elaborate graphs quickly for those who know how to use it. Copy protected.



PROBLEM: The more experience your hard disk has, the harder it has to work.

THE SOFTLOGIC SOLUTION: Disk Optimizer™

Your hard disk will run faster when it's not chasing around after files.

Remember the old days when your hard drive was new Remember that month, fast, slick performance! These most retrievals, regel asses, lightening the darkness constitution, and the state of the state of

Loading is slower.

Sorting is slower.

The more for Retrieving, backing-up.
Everything takes longer because your disk has to work harder.

Problem is, it's something that happens so gradually you may not notice the difference. At least, not unril you see the dramatic improvement after using Disk Optimizer.

File fragmentation—It's a problem you can see.

Watch your hard drive the next time it reads or writes a file. Each "blip" of the LED means the drive-head is moving to another place on the disk—either to pick up or lay down another chunk of data. And the truth is, head movement takes

time. Far more time than actual reading and writing. What's worse, all this head movement causes extra wear and tear that can shorten the life of your drive.

Disk Optimizer-Tunes up your disk by cleaning up your files.

Disk Optimizer works by finding all the scattered pieces of your files and putting them back together where they belong. Next time your drive reads it, there's just one place to look.

And the results are often dramatic. Reading and writing times may be cut by as much as two thirds. Database sorts that used to take hundreds of head moves now proceed quickly and efficiently. And since head movement is now at an absolute minimum, your disk drive will lead a longer, more productive life.

Analyze, scrutinize, optimize.

Before you optimize, you'll probably want to analyze. So Disk Optimizer shows you, in percentages, how much fragmentation has taken place—on the entire disk, in individual directories, or for groups of

files you specify using global or wildcard names. Plus, there's built-in data security that lets you assign passwords to as many files or

file groups as you want.
And the File Peeker gives
you an inside look at the
structure of files. It's a great
way for non-programmers to
learn more about computers,
and a powerful tool for
professionals who want to
analyze the contents of their

Get your hard drive back in shape—at a special low price.

When you think about it, it's simple. The longer you own your hard drive, the more you come to depend on it. But the longer you wait to get Disk Optimizer, the less performance you'll

And the less chance you'll have to buy Disk Optimizer at the special introductory price of

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by choosing options by number from the menus. Many of the problems for the beginner arise from lack of understanding of how the options interrelate. For example, ou can't use lines connecting external percentage labels to applicable slices of a pie without also turning off the legend box display; this action causes both slice labels and percentages to be shown adjacent to the slices—with connecting lines if you want them.

The size of graph files is not a problem. The package uses virtual memory and swaps to disk any portion of a file it can't hold in RAM. Not all aspects of a graph are easily controllable, though. You can specify the color for the first slice of a pie; the program will then select the others.

based on algorithms of its own.

Lessons on paper plus interactive tutorials and help screens assist you in learning the software. The manual is large and adequate, but it does have some minor errors and omissions. Telephone technical support is free. One-day training classes are available in Los Angeles and Chicago for a \$250 charee.

Neither the menu structure nor the command language are awkward for the seasoned user. And the program is well behaved, unless you try printing to a device that's not on-line. Then it will freeze up without a warning message, and you'll have to reboot your system.

If you have an 8087 or 80287 math coprocessor chip, you'll be able to calculate

and plot to the screen at a remarkable speed even on an XT—in something like a code ple of seconds for most images. Without the chip, redrawing a detailed screen could take as much as a long minute or more, even on an AT. If you can afford the fare and have elaborate graphing needs, however, Graphics Express can get you there. —Marvia Baye.

Impressionist

Impressionist, from Execucom Systems Corp., is a powerful business graphics program that was designed 5 years ago for mainframe computers. It seems to have been ported directly to the PC rather than redesigned for the PC, so the user is faced with what can only be described as a userhostile interface. Impressionist does have the features necessary to create complex. superb-looking charts, but mastering this program is a nightmare. The menu forces you to learn a new vocabulary of charting terms; it provides no useful prompts. Online help is not as helpful as this complex program demands: the two oversized manuals are neither clear nor organized; and at least half a dozen times during my testing the program froze the keyboard or dumped me out to DOS. Impressionist may be one of the worst-designed pieces of high-end software ever released for personal computers.

The big question concerning Impressionist is this: Who is the appropriate user? It's menu driven, so you might suppose Impressionist is designed for the average businessperson—until you try to learn it. The menus consist of one- or two-word choices that usually do not provide enough clues to their meanings.

The methodology behind building, displaying, and printing, or plotting a charge just as confusing as the menu terminology. Data entry and editing is clumpy, Impacts soinist uses no worksheet or arrangement of rows and columns for data entry; instead, you first set up the type of data you wish to enter, then type the data as a list. To edit, you must give the program the

number of the series you wish to change.

For example, to create a bar chart of
two variables across 6 monthly periods,
you first select Curves from the menu (no,
I don't know what the name has to do with



Although Graphics Express, supports a number of output supports a number of output primary purposes is to offer support for Bell & Howell is own film recorder, the Color Digital Imager IV, with which the image below was output. The package creates all the major chart types, except or optimizational charts. It operates using an intricule two-level program strate are designed to provide powerful features for a provide protection of the protec





PROBLEM: Handling your need for more megabytes, without spending megabucks on a new drive.

THE SOFTLOGIC SOLUTION: Cubit

Now get up to twice the capacity from all your storage media.

You know what happens. The more you use your computer, the more information you create. And the faster you fill up your disk. The IOMB drive that once seemed enor-

mous is now jammed with important files. That 20MB that should have lasted years is crowded in a

matter of months. Of course you could keep buying bigger hard drives. Or you could ger Cubit and get the maximum storage space from the drives you already have.

What is Cubit?

In brief, Cubit is an advanced software tool that automatically reduces the number of bytes required to store a file, then converts the file back to its original size when retrieved. Some programmers call this effect "data compression," others, "disk expansion," Either way, the result is the same.

Here's how it works. When Cubit compresses a file, it first compares each word to its massive English word dictionary. Words that march are reduced to a predetermined code of just one, two or three bytes each. It then saves the abbreviated version to disk. Decompression works just the opposite.

To accommodate other words and symbols, Cubit uses two more compression techniques. One assigns new, shorter codes to unusual words. Another compresses according to the frequency of character strings in non-text data. So no matter what kind of files you create, Cubit ensures maximum space savings.

Best of all, you'll be using the same fast reliable dara compression techniques used on mainframe computers for decades.

language symbols-we've optimized Cubit for word rocessing and darabase files. With these, you'll get a up to a full 100% or more. At the same rime, you can expect a significant 30% to 50% improvement with

graph and image files, even binary And Cubit works just as well with floppies and rape cassettes as it does with hard disk drives.

Run Cubit where you want,

for all your files, or maybe just

some. So Cubit lets you specify

exactly which files to work on

and which ones to leave alone.

In RAM resident mode,

wirhin any program you run.

management mode. It supports

Or use Cubit's powerful file

Cubit works quickly and

invisibly, compressing and

decompressing right from

Maybe you'll want to use Cubit

when you want.

How much disk space will you save? Because the vast majority of data created on PC's is standard ASCII text-letters. numbers and other English

minimum of 50% expansion on other kinds of data. Including spreadsheet files, program code,

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but charts, either and then type 2.3. This signifies that you will be using two variables in the series. It is a rule that your first variable cannot be the number 1. Then you must select Points from the menu and type 16. This signifies that you will be supsist data points in the chart—in other words, bars for January through Janue. After this is set, you may settle fairer bata, and the program will prompt you to entire and the program will prompt you to entire clear to fir, you should rush out and buy for the program of the program of the program of the clear to fir, you should rush out and buy furnerscinitis—if you work full of program.

Impressionist—it's your kind of program. Installation is simple and automatic, with little room for error, it takes about 15 minutes, and the copy protection allows in the copy protection allows in the copy protection allows in more difficult, partly because Impressionit's in designed to accommodate multiple users without mixing up their respects the files or device drivers. You can set up as many work directories as you like, and each must have it's own configuration files. So after you configure, you must copy the edvice driver files to the subdirectory in which you plan to work it this manner.

other user is set up for color display and a plotter or camera, and so forth. This is a good idea.

TECHNIAL TROUBLES. However, my real trouble with configuration with configuration with configuration with configuration the display console. There is no reference meritated not the question you must astrony our must are in the configuration process, except a first of available devices. The lest equipment of a z36K6 byte IBM EGA board and a NEC MultiSyar monitor. The choices not the video display adapter list in the manual intervaled missing and first production of the configuration of th

choices: 640 by 350, 640 by 200, and 320

by 200. Naturally, I picked the highest res-

olution, which the EGA supports. The program warned that I must have the memory expanded on the EGA board (which the test system had), so I proceeded with my other hardware selections, copied the files to my subdirectory, and started the

program.

I followed the tutorial in the manual, typing in exactly what was printed. It was confusing, but I stayed with it until my data was entered and I had picked and titled a bar chart. What I saw one-contwhen I displayed the graph was something eise—a broken pattern of colors and shapes behind which could vaguely be seen the accurate charling of my data. After exiting and reconfiguring in the various EGA modes with no more success. I called



Impressionist is one of the most feature-filled programs reviewed in this issue, offering all of the major chart types, as well as 3-D charts. I talso supports a wide range of graphics adapters and output devices. The pic chart felow was output using a Martis-GCR image recorder. However, impressionist may have one of the worst user interfaces of any highend software ere reloased for





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(512) 346-4980 (in Tex.) List Price: 5995 Requires: 512K RAM; (wo disk drives; DOS 2.0 or later. Supports: IBM Monochrome Adapter,

CGA, and PGA: Herules memochrone: graphs: card, Number Nie Revolution board. Tecruar Graphics Maste Adapter: Plantroites: Color Plus, card. Dor marris, inis, yet, and lines printers; plotters. Padariol Palette. Martis QCR. Martis PCR, and CalComp Samurai image recorders; Video Show 160 percentation system. In Short: Superb output carri make up for the clurmy interface, skimpy help. EGA incompatibility, and high price of this adapted mainfarme programs. Copy

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technical support. Several suggested sloptions were attempted, but we could as the time where the support of the program to run in EGA. In frastration, I reconfigured for PC Graphics, redisplayed my graph, and was assounded at the uplines of the default color scheme and uplines of the default color scheme and the chart close, but when I displayed the the chart capain, the colors were not right, and not much better than the defaults. Played, er, the same output plotted to the HP 47456 was orgeous, and color selections

were what I had expected. I had a number of other problems completing the charts required for this review. For example, after entering the labels for the bars (the years 1980 through 1986 in this case), the program displayed onscreen and on the plotter the numbers 198 below each bar, with plenty of room for the missing digits. I reentered the labels, with the same effect. Then I noticed an automatic label feature for months or years. I picked years and was prompted for the starting and ending years. I typed 1980 and 1986. And once again all the bar labels read 198. I took a walk, contemplated never coming back, but tried the last resort-tech support. As it turned out, another menu offers a choice for Label Length: the default is three characters.

Technical support for this product was good, with the exception of the EGA problem. The people I spoke with were helpful and understanding. They seem very used to guiding people through the menu mazes.

Impressionist hung up at several points when I tried to implement improvements to my charts. Several times the program crashed to DOS, and in all cases I lost the additions and edits I had performed. When I tried to exit to DOS, I thought I would have to reboot: I went down every menu and tried every choice, almost panicked by not being able to find a way out of the program. Everything is menu driven, so the exit must be on a menu, I assumed. I looked up Ouit in the index: the reference manual cited the combination Alt-S. I figured Alt-S stood for Save or Store. It stood for Stop, and I found myself at DOS, having lost another session of edits.

Mainframe programmers, seasoned hackers, and users with a high tolerance level for frustration would likely have the patience necessary to stick with Impressionist long enough to learn it well. But the rest of you can forget it. So long as you're using personal computers, there is no reason to use impersonal software.

-Phil Wiswell

PCchart

Aztek's PCchur may well suit users who need superior-quality charts and slides but who don't want to spend a lot of time learning how to make them. It's easy to use, can specify colors from a tremendous palette, and can generate impressive results (albeit only from professional slide production centers). The flipside of all this is a high price tag and some vering diffi-

culties. At least a few of those difficulties, however, may disappear with the next release—and that could make *PCchart* a program worth having.

program worth having.

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and an difficult to run on a hard disk, in

fact, the program runs much belief on a

dual floppy disk drive setup. In order to

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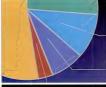
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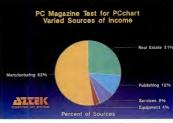
that, whenever you want to use the pro
gram you have to weap disks in drive A: a

few times before you can get started. Al
flowigh you can size data file-only out hand

that's traily inconvenient. An Artick.



While PCchart can produce many charts in many variations, the basic formats for each look are predefined. The program can access a palette of up to 14,000 colors, which you output in the farm of slides. You use an included utility to transfer image files to Aztek Art Centers and Slidegraphic Service Centers. The image below was output using the Aztek Film Station 4000 image recorder at an Aziek Ari Center, Hawever, the only way to get an immediate printout from the package is to use the PC's PriScker



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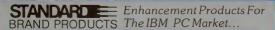
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spokesman said the next release would remedy this problem.

Once you get by the installation and start-up snafu, PCchart has a lot to offer. The program uses a spreadsheet-based paradigm to create charts, so both the screen appearance and cursor movement should make any spreadsheet user feel at home. You specify both a visual name (to select the graph type) and a data filename (if one exists), and then enter text and/or data into the spreadsheet cells. Pressing F2 generates the chart on the screen. Also, PCchart will import any data in .DIF, ASCII, or WKS formats, automatically renaming the file with the PCchart "AZF" extension. Converted files can thus be graphed immediately without any other translation.

STRUCTURED APPROACH PCchart takes a fairly structured approach to producing charts, which has its good and bad sides. The product can produce many charts in many variations, but the basic formats for each look are predefined. This means that new users can simply enter data in the appropriate places and generate quality output without considering the

complexities of formatting and design. The drawback, of course, is that advanced users don't have the same control over their output's appearance as they would

with some other products.

Still, if having everything spelled out for you sounds good. PCchart might be appealing, particularly given its superior output. The program accesses a palette of up to 14,000 colors. You can define and save palettes with chart formats and send the output to various slide centers for processing. The product includes a utility that allows transfer of image files to Aztek Art Centers and Slidegraphic Service Centers; also, you get a list of addresses where you can send data disks for generation of highquality slides, film, and other output.

While PCchart can produce very high quality output at remote addresses. it can't do much locally. The product does not yet take full advantage of high-resolution screen drivers (although it functions with them) and has no direct output drivers. The only way to get an immediate printout is to use the PC's PrtSc key, which furnishes output of less than presentation quality. This problem, however, may be shortlived: Aztek says the program's next release will include some printer drivers.

Another, more minor problem relates to the way PCchart reads spreadsheet information. If you enter data and then delete it by backspacing or using the Spacebar, the program takes that to be a legitimate line of 'null' data and reads it into the chart. Therefore, you may turn out charts that seem to be missing data. The remedy, obviously, is to exercise caution when editing the spreadsheet.

The documentation is adequate, although it could have added more-detailed explanations in some areas, especially considering the program's structured way of looking at things. It does contain numerous examples of chart formats, however, and the utility disk has quite a few sample charts. Vendor support struck me as reasonable; the staff seemed knowledgeable, and I didn't have to wait long to talk with

On balance, PCchart presents a curious mix. It can produce some tremendous output professionally, yet it doesn't provide printer drivers. It is designed to make life easy for the novice, yet it won't operate

without an 8087 coprocessor installed. Although its drawbacks preclude a strong recommendation, many of them are apparently being addressed in the new release. In its current form, PCchart has a few too many stumbling blocks, especially for \$695. If those are indeed removed, users seeking the ability to produce superiorquality output will want to look at this package. - Jon Pepper

PresenterPC

Dicomed Corp. 's PresenterPC is designed to produce disk files for final output through the company's high-end slide and film equipment, available for \$150,000 or through Dicomed service bureaus. The package offers a selection of 24 chart types, including organization, tabular, and word charts. It incorporates sophisticated features such as moving text, printing in reverse, and a palette of 64 colors for complete, professional-quality presentations.

To use PresenterPC, you follow menus modeled after 1-2-3: prompt words appear at the bottom of the screen, with an expanded prompt explaining the selected command. You press Esc to return to the main menu of seven commands and F1 to get context-sensitive on-screen help. To build a chart, you first load or create a chart







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In Shurt: An easy-to-use graphics product that can turn out high-quality output from professional slide production centers PCchart has a few major bugs, but these could well be ironed out in the next release

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file, defining basic characteristics such as chart type and size. Then you enter data on a spreadsheet screen-identifying ranges of cells as data or axis labels and defining colors for each range. You can also import data from spreadsheet or database programs that save files in .DIF format.

After you generate a chart, you can use PresenterPC's freehand drawing capability to enter titles, labels, legends, and so on, from the keyboard. You can also play with the text, stretching it to any size or shape, slanting it at an angle or keeping it straight, and putting a box around it.

Besides its wide range of colors, PresenterPC incorporates three features that make it exceptional among business graphics packages. First, using Presen-

terPC's built-in graphics tools, you can add simple graphics (lines, squares, rectangles, and circles) to any chart. Second, you can select and move objects, including headings, legends, and graphic objects (but not the generated elements of the chart such as pie slices and bars), on the screen easily. Third, you can print text at any angle and even in reverse for a mirror-image effect. These features alone make PresenterPC a true artist's tool, rather than sim-

TWO-FILE CHART In the end, each PresenterPC chart is composed of a chart format file and a .DIF file. The chart format file can serve as a style sheet for creating other charts. For example, you can cre-

ply a business graphics generator.

ate a whole series of pie charts using one chart format file that defines the chart's type, colors, borders, and so on, and a series of .DIF files.

Compared with the other graphics packages we tried. PresenterPC was relatively difficult to learn. The menu structure starts with seven main menu items and descends five levels to encompass over 300 commands. Even with access to contextsensitive help screens and the 500-page manual, we found it hard to interpret some of the menu words and messages. For example, text size is entered in numbers that represent width and height, but the onscreen help did not indicate what unit of measure we were to use. One screen message revealed that the text size was "1228. -2212": it turned out this meant we could print text upside down and backward by entering negative numbers for height or width

Luckily, most of the Dicomed service bureaus are value-added resellers (VARs) who sell the PresenterPC package to their clients and offer training. A few hours of assistance from an experienced operator could save days of personal exploration and calls for technical support. Our package included a list of 25 VARs in the United States plus 12 in the rest of the world.

The version of PresenterPC we reviewed could print images on dot matrix printers and the HP Laser let for proofing. but the printouts were generally not suitable for final copy. For one thing, the nackage is designed to print in color, and no fill patterns are available for distinguishing between data groups printed in black and white. The next version of the product will add more output formats and device capabilities, including NAPLPS format (for Video Show), SCODL format (for use with the Matrix MVP rasterizer and Matrix QCR/PCR film recorders), TT200 thermal hard copy, and the Diablo Ink Jet Printer. Still, we expect that most users will want to use Dicomed's high-end

Because of PresenterPC's relatively long learning curve and complex menu structure, it is well suited for experienced technicians and serious users who need to produce high-quality slide presentations on a regular basis. -Diane Burns and S. Venit

equipment for their output.



PresenterPC is designed to produce disk files for final output through Dicomed's high-end image recorders or service hareaus which is how the nie chart below was oatput. While the package can print images on dut matrix printers (used for the detail shown) and the HP Laserjet, the printoats are not suitable for final copy. The package itself incorporates sophisticated features such as moving text. printing in reverse, and a palette of



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COVER STORY WINN L. ROSCH

Wipes, Pans, And Fade-outs: Animating Your BUSINESS GRAPHICS

ust as one picture is worth a multitude of words, a moving picture can communicate complex ideas and concepts better and more clearly than do static images. On-screen action draws attention, too, turning dull business pictures into the swiring images the television generation

Presentation graphies packages such as Brighbill-Roberts/ The Marketing Channel and Co.'s Show Partner, IBM Corp.'s PC Storyboard, PCsoftware of San Diego's Executive Picture Show, and Visual Communications Network's Execut Vision and Concorde create such animation right on your PC's secreen and even transmit

To catch the eye of a jaded audience, you'll need to add extra flourishes to your graphics presentations. The five packages reviewed here do just that by creating animated sequences right on your PC's screen of or use on a video display. But the downside to this advance in business presentation graphics is the software's limited color and resolution.



moving images to large audiences via videocassette recorders and video projection systems. Using such packages, you can make your business presentations not only clear and functional, but memorable.

Unlike traditional PC-based presentation graphics programs, which use the computer simply as a means of preparing graphic images, these presentation programs turn the PC itself into the presentation medium. The computer makes and displays entire shows and even allows viewens to interact with the show, branchviewens to interact with the show, branchviewens to interact with the show, branchen responses to on-screen prompts. Praeral responses to on-screen prompts. Pratical applications range anywhere from boardroom graphics to interactive training to advertising.

On the surface, all of these programs work like the functional equivalent of an ordinary 35mm slide projector. Central to all of them is the ability to organize a sequence of images that can be painted across a computer monitor or video dis-

play. The software spices up the slide shows by electronically programming transitions. Television and motion-picture effects called wipes and dissolves are simulated by having one image push another off the screen, one screen pop over the previous one a pixel at ait time, or a new image burst from an existing one. By changing an entire image op portion of the screen quickly time to the programming of the programming mentary animation. Although they card told a candle to Wall Disney, their added action can breathe life into the dullest presentations for training exercises.

Of course, before you can have a slide show, you need slides. These video presentation programs address that issue as well. All have some ability to generate and edit on-screen images.

Most of the packages mimic free-form painting programs (like PC Paintbrush and Dr. Halo) so that you can sketch ideas on your video screen. However, these programs lack many of the features, depth, and ease of use generally associated with dedicated screen-painting products.

Most video presentation programs can also generate graphs from numbers that you either type in or import from file-based spreadsheet data. Although dedicated charting programs may provide more

graphing options, these new presentation systems give you a greater ability to enhance your charts using their graphics editors.

All of these video presentation programs incorporate some kind of screengrabbing program that lets you record and store anything that appears on your monitor in a disk file. If you wish, you can later redisplay the screen as part of a slide show and, in many cases, edit and enhance saved screens.

Each video presentation program manufacturer uses its own format for the files that are grabbed from the screen. These files are not compatible with any made by the screen-grabber of a different manufacturer.

Most of these video presentation systems include a run-lime module that allows you to package and distribute your finished slide shows on ordinary floppy disks. The run-time module automated you control structions generated by the slide show package. Because the run-time module does not have the advanced editing features of the full video presentation packeae, it takes up less room on-disk allowing you to send out bigger shows, and it limits most unauthorized tampering with your

IMAGE IRRITATIONS A major problem with any sort of image-making—on paper, canvas, or computer—is the time involved. Although you can use and duplicate computerized designs very quickly our are still stuck with the chore or cein ig an original image. Moreover, conjuning up pleasing images requires real artistry. These requirements are expensive in comes to developing complete animation sequences, the costs can become overwhelming.

The quickest and easiest solution to these problems is prefibricated artwork. The publishers of video presentation programs generally include modest libraries of predrawn images—electronic clip art—that you can incorporate into your electronic slide shows with a minimum of work. In addition, auxiliary libraries are offered by some publishers and, increasingly, third-arty suppliers.

Although they can't hold a candle to Walt Disney, these programs add action that can breathe life into the dullest presentations or training exercises.

HARD LIMITS The ultimate on-screen quality of these video presintation programs is as good as anything you can display on your monitor. In general, they are quite quick in making on-screen changes. All of these programs face the same fundamental limits, however. Their quality can never exceed the modest capabilities of the various PC display systems. Their speed is highly dependent on the power of the computer the programs are run on.

Many of these programs are designed amount the ordinary IBM Color Graphics Adapter (CGA) in medium-resolution mode, which allows four simultaneous onscreen colors with resolution of 320 by 200 dots. Such pictures make even Saturday morning cartoons look good.

If the slide shows are to be used and distributed as conventional video (see slidebar "Composite Video Output: From the PC to the Big Screen"), then the CGA is anadatory choice. It is the only GIA is a mandatory choice. It is the only GIA is a with the NTSC (National Television Standards Committee) signals that are used by ordinary video monitors and VCRs.

orunary vaceo monitors and V-Rs.
Two of these programs—Concorde and
Show Partner—push resolution and color
selection up to the Enhanced Graphics
Adapter standard: 464 by 350 pixels in 16
colors. EGA-quality slide shows can be
shown directly only on EGA-equipped
computer systems, however.

All graphics programs push the PC to its processing limit. Making and moving images requires a huge number of calculations, and updating screens fast enough that the audience doesn't fall asleep requires clever software design.

While all perform adequately on a plain PC, these programs benefit greatly from the added power of an AT or a faster compatible, both during the creation and the display of slide shows. Because images are stored on-disk until needed, action is speeded up and chanaced with a hard disk. In fact, many of these programs make a hard disk mandatory.

As with all software categories, the developers of video presentation programs each use their own unique user interface and mix of features, though the programs are designed for essentially the same end. Here's a guide to the currently available video presentation programs.



Because creating pleasing images requires real artistry, a requirement that is expensive in terms of time and talent, many of these packages include prefabricated artwork. The sample above comes from Visual Communications Network's Concorde.

Show Partner

While the original Show Partner rated mostly as a low-cost alternative to IBM's PC Storyboard, Version 2.0 gives the program a completely new personality. Whereas the original Show Partner was a bit buggy, the new version is the most polished of the video presentation packages examined in this article—and probably the most powerful.

Show Partner really shines in its consistent user interface, which is based on a Macintosh-like system of pull-down menus that you can control either by cursor keys or a Microsoft Mouse. (The program is included free with the Microsoft Mouse and many other products.)

Show Partner. Version 2.0. gives you two memory-resident programs to grab screens. Capture is a compact program that merely routes images to disk. The muchlarger GraFIX Editor. Show Partner's free-form image creating and enhancing program, can also be made memory resident and will grab screens.

Either program works in any screen mode—text or graphics. Unlike some slide-show packages that require you to run a utility program from the DOS prompt to convert text screens to graphic format for later editing, both Show Purtner screen-grabbers handle this chore during the save process.





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List Price: S79; optional modules: NoShow, \$500; MemShow, \$600 (\$100 H upgrading from NoShow); ProShow, \$800 (\$100 or

\$200 if upgrading from NoShow or Mem-Show, respectively; Font Editor, \$59; Windows Capture, \$39; Text Screen Editor, \$59 Requires: 256k RAM for CGA or Hercules monochrome graphics display (384k RAM for EGA display) one disk drive, DOS 2.0 or later.

In Short: Presentation graphics screen animator with image-capturing software, memory-resident graphics editor, and royalty-free run-time module that supports a wide variety of dot matrix, inkjet, and laser printers. Not

COPY protected.

CRICLE 676 ON READER SERVICE CARD

SHOW PARTNER ADDS SPICE TO PC LIFE

Editor Mike Sullivan uses Show Partner's visual presentation capabilities to their fullest to publish the on-disk magazine PC Life.

Presentation graphics packages such as Brightbill-Roberts The Marketing Channel and Co. 's Show Partner are a bonn to business professionals who want lively demonstrations. But many business users may not be using the software to its full potential. Mike Sullivan, editor of PC Life, a fledgling magazine published on floppy disk, uses Show Partner in a warety of innovative ways that sugerest toosibilities for other users.

For instance, a review of Microsoft Windows in the magazine's first issue uses Show Partner for both its structure and its visual impact. "When we did the Windows story," Sullivan remembers, 'we created an animated keyboard.

mouse, and screen to simulate how Windows actually works."

The resulting Show Partner graphic, generated in medium-resolution mode, faithfully mimics the functioning of Microsoft's new DOS environment. Simulated keystrokes and mouse movements produce appropriate changes in the animated screen.

The animation takes up about half of the monitor screen; the accompanying text scrolls by beneath it. While the scrolling text capability is not available to general users in the current version of Show Partner, it will be available in Show Partner Plus, which is due for release in the first quarter of 1987.

Another Show Partner feature that PC Life puts to creative use is the package's ability to pull in .EXE or program files without leaving the magazine. In PC Life's second issue, for instance, readers can play a real computer game. When the

game is finished, the magazine picks up where the reader left off. The magazine plans to continue using this feature. PC Life also makes innovative use of Show Parme's familiar visual presentation capabilities. Sullivan uses unified visuals to keep the magazine's slook consistent. For example, the magazine presents headings in a consistent fashion. For each story, a main headline scrolls up, a

tent. For example, the magazine presents headings in a consistent fashion. For each story, a mish neadline scrolls up, a rule is wiped in beneath it, and a subbead is faded in beneath the rule. Similarly, the PC Life logo is presented consistently, though the accompanying artwork and text may vary. Other Show Partner techniques, such as wipes and fades, become part of the logo.

Story illustrations also serve to pique and sustain reader interest. A start pacest, created with overlaid images, is one such device. A star appears, flashes, then fades. "What you want is to create a sense of anticipation," says Sullivan; 'on the viewer doesn't know what to expect on the next screen." He says that many conventional cartoning effects can be easily adapted to Show Partner and cm add visual soice.

While PC LIfe is a polished publication put together by skilled professionals, Sullivan suggests that many business usercoold ap many of the same capabilities he uses in assembling the magazine. "People tend to use the side-show conboserves, "when with a little more effort, they could fast and out or even fort, they could fast and out or even years." If they explored the program a little more, they would discover a lot more of its power." —Journals in Kingley, and its power." —Journals in Kingley, and the its power. "Appendix her program is little more, they would discover a lot more of its power." —Journals m K. Matzkin is sometiment of the program of the program of the its power." —Journals m K. Matzkin is sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the sometiment of the program of the program of the program of the sometiment of the program of the program of the program of the sometiment of the program of the program of the program of the sometiment of the program of the program of the program of the sometiment of the program of the program of the program of the sometiment of the program of the program of the program of the sometiment of the program of the program of the program of the program of the sometiment of the program of the program of the program of the program of the sometiment of the program of the prog



Switching between tasks running under Windows is easily accomplished with a mouse. To switch to MS-DOS Executive, for instance, the user moves its icon into the work area.

The screen is split down the middle, with windows of equal size devoted to Write and to

PC Life, a fledging magazine published on floopy disk, uses Show Pattnee in a variety of immonitive ways that maggest possibilities for other users. For instance, for a review of Microsoft Windows, PC Life created an animated keyboard, a mouse, and a screen that simulate how beneath it.

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Making the graphics editor memory resident may seem like a strange fluke, but it can be extremely useful. You can enhance charts as you draw them, even within another application, or you can change details while you are preparing a slide show.

The GraFIX Editor allows you to move, copy, fip, reflect, rotate, center, and erase on-screen areas. You can use it to enlarge to double size or shrink to half size) screen images. GraFIX also includes primitives for drawing circles and boxes, as well as permitting freehand drawing in various line weights and colors. You can also use GraFIX to fill in shapes, change their textures and colors, and edit single

pixels using a handy zoom feature.

For text slides, you have your choice of 20 typefaces in three sizes and three slants (vertical, left, and right). You choose the options and color you want before entering text, and then you type the words you want just as you would with a word processor (without word wrap. however).

Show Partner lacks an internal graphgenerating system. You have to rely on other programs to draw bar and pie charts, then import them into your slide shows using one of Show Partner's screen-grab-

bers.

You use the Show Partner script editor,
Sed, to organize slide shows. The script
editor uses the same menu-driven interface
ming-l

and allows you to select the images, type and length of transition, and the screen area to be affected. It permits you to select several varieties of transitions from screen to screen, including simple replacement of one screen—of a portion thereof—with diagonally; a two-screen intervewer, fairing; and relatively smooth scrolling. You can assign one of three speeds to the effects, which vary with the model of computer used, and set display times for each condition of the condit

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slide shows interactive, the show can branch in different directions depending

on the user's response to questions Show Partner provides three internal sound effects (noise, homb, and slide) and hooks for adding sound routines written in languages like Microsoft QuickBASIC. Turbo Pascal, and assembler. In addition, an expansion board, called the TrueSound Card (which is available from Webco, in Sacramento, Calif.) can digitally record sounds-voice, music, and effects-on floppy or hard disk and play them back with telephone-like quality, synchronized

with the slide show. Included with Show Partner is a runtime module about 15K bytes long called Show, Show, which can be distributed with presentations without royalty, precedes each presentation with a Brightbill-Roberts' copyright message. Alternative nun-time modules without the convright message are available for an extra charge.

A small clip-art library and animation demonstration is included with Show Partner. In addition. Marketine Graphics produces animated clin-art libraries for Show Partner (see sidebar "PicturePak Image Libraries Add Life to Presentations").

Show Partner operates with all standard IBM graphics adapters including the IBM Color Graphics Adapter, the IBM Enhanced Graphics Adapter, and the Hercules Graphics Adapter. Most display modes are supported, including the highest-resolution multicolor modes. Instead of using separate drivers, however, the program determines for itself what monitor and color display abilities are available and adjusts itself accordingly

For hard-copy output (without animation, of course) Show Partner will drive any of about 60 printers and the Polaroid Palette film recorder.

The current marketing philosophy behind Show Partner, Version 2.0, seems akin to that of Turbo Pascal: offer a lowcost program at relatively little profit and make money with add-ons such as PC PicturePaks and the TrueSound Card. Other add-on products should be announced by the time this article appears. All this can be a big benefit-you don't need to pay for features you won't use. As with Turbo Pascal, the basic Show Partner Version 2.0. program is one of the best bargains around, and it includes all the features that most people will ever need.

PC Storyboard

While other presentation graphics products came out before PC Storyboard, it was this product that gave IBM's stamp of approval to the category.

Four individual programs-Picture Maker, Picture Taker, Story Editor, and Story Teller-handle the separate functions of the PC Storyboard package. These programs come on three floopy disks and. when accompanied by the demonstration programs, take up slightly less than I megabyte of hard disk space.

Picture Maker combines a paint program, a graphics package, which creates graphics from data, and a free-form editor for manipulating existing images. You can also combine text with the graphics. PC Storyboard comes with a small clip-art library. Separately published image libraries, called PC PicturePaks (see sidebar, "PicturePak Image Libraries Add Life to Presentations"), are also available.

Picture Maker has a repertory of four basic chart types: vertical and horizontal bar charts, line graphics, and pie charts. However, the program does not readily

import data from spreadsheets into graphs. For text displays, Picture Maker offers five sizes of four type fonts including bold, thin mman, and PM (for Picture Maker). You can also choose the color of the text characters, as well as the outline and shadow colors, size, and position.

The Picture Maker graphics editor includes a few graphics primitives, commands that allow you to draw elementary boxes and circles, area filling, freehand sketching, and pixel-by-pixel manipulation, but it lacks many advanced graphicsmanipulation functions such as the ability to rotate or reverse portions of an image. Size changes are limited to simple enlargement. Complex images are best drawn using another program and then imported into Picture Maker.

The frame-grabbing Picture Taker module redirects the normal PC printscreen function to route on-screen images to disk files. Although Picture Taker can capture nearly anything drawn in a standard IBM screen mode (40- or 80-column text and medium- or high-resolution graphics), it can edit only those images grabbed in medium-resolution graphics mode

Once you've either created or grabbed images using the other two modules, you can use Story Editor to organize those images into presentations.

Story Editor works like a permanently formatted spreadsheet. All commands fit into individual data entry cells. First you specify the name of an image file, then the method, direction, and duration of the transition period between the images, and, finally, the length of its display. You can selectively change and edit parts of images. As you go along, Story Editor allows you to view each transition and alter it instantly.

Once you've organized your slide show with Story Editor, you show it using Story Teller, a simple run-time module. As such, Story Teller is the only part of the PC Storyboard package that you need to display the completed presentation. IBM grants a blanket license that allows you to freely duplicate and distribute the Story Teller module for use with your PC Storyboard presentations, provided you give a copyright acknowledgment in the presentation and on all disks that the module is copied to.

The command structure of PC Storyboard is a combination of menu- and com-





List Price: \$275 Requires: 256K RAM (320K RAM with DOS 3.0 or later 384K RAM with PCir.), two disk drives, CGA or EGA (in CGA mode), DOS 2.0 or 2.1.

In Short: A video slide-show program package, including a modestly powerful convenience editor, a screen-capturing program, a nmer, and a run-time module limited to CGA resolution and color. It supports a variety of dot matrix and inkiet printers. Not copy protected. CIRCLE 877 ON FEADER SERVICE CARE



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PICTUREPAK IMAGE LIBRARIES ADD LIFE TO PRESENTATIONS

Marketing Graphics makes graphics image libraries to enhance PC Storyboard and Show Partner presentations.

et's face it. Good business people Jaren't necessarily good graphics artists. To help out business graphics users, therefore, libraries of graphics images, which often include maps, borders, and even drawings of people, have long been available with graphics packages to help dress up business presentations. But Marketing Graphics has put a new twist on these image libraries. The company offers them for other companies' products-namely, separate libraries for PC Storyboard and for Show Partner-and includes animation sequences more complex than the original packages can create themselves. Used judiciously, these animated screens can add life-and even laughs-to otherwise ordinary presentations

THE PC STORYBOARD SERIES Each of the PC Storyboard series of PC PicturePaks consists of six floppy disks: four of static images to cut and paste into slide screens and two of brief animated

slide screens and two of brief animated sequences. Currently available titles include Eye-Openers, Holidays, the PC Family, and TypeStyles. Eye-Openers are designed primarily

Eye-Openers are designed primarily as attention-getters general enough to fit almost any business situation. The images and action help boost success, motivate sales, and otherwise create a modest uproar. Holidays include seasonal scena and calendar dates. The PC Family is designed for those folks who sell IBM per-

will adequately convert mouse movements

into cursor strokes

By the now-normal convention, a press of p brings in-depth on-screen help, which is especially useful on two-monitor systems: the help appears and lingers on the monochrome screen even after you resume drawing.

FACT FILE

PC Storyboat

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(800) 368-3773 (804) 788-8844 List Price: Eye Openers, \$195; Holidays, \$195; The PC Family, \$195; TypeStyles,

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[804) 788-8844 List Price: Executive and Management Edition, \$129; Finance and Administration Edition, \$129; Sales and Marketing Edition, \$129.

Requires: Show Partner, DOS 2.0 or later. In Short: A useful set of electronic clip art and clever animation sequences specifically designed for adding attention-getting devices and action to Show Partner. CRICE 872 ON PEADER SERVICE CARD sonal computing equipment or train others to use it. It includes images of almost
everything in the current product line, including such animated wonders as printers that continuously churn through paer and a finger poking a keyboard.
TypcStyles extends the small variety included with the PC Storyboard package
itself.

THE SHOW PARTNER SERIES The Show Partner scries of Picture Pake seach include 60 full-screen illustrations, more than 100 icons and symbols, and ten animation sequences. Although the Show Partner series shares many images with the PC Storyboard set, it is targeted more toward business.

Its Executive and Management Edition includes highlights and introductions suitable for kicking off presentations, as well as many borders and backgrounds. The Finance and Administration Editions includes images that focus on such botions as time and money, productivity and performance, and communications and technology. The Sales and Marketing Edition images reflect goals and motivations, people and places, and travel and entertainment.

As is the case with the slide-show programs, the images included in the PC PicturePaks libraries can also be duplicated and included in presentations as long as the proper credit is given to the publisher.—Winn L. Rosch

Although quite useful for business presentations, PC Storyboard is limited by its medium-resolution, CGA-only (four-color) display quality, (Although the PC Storyboard system will work with the IBM Enhanced Graphics Adapter, it is not designed to take advantage of all the color and resolution capabilities of that hard-

specify several parameters to describe the chart. Help is available by a press of F1.

COMMANDS PC Storyboard requires you to use cursor keys for freehand drawing. No provision is made for mouse control, though some generic mouse drivers.

mand-driven designs that requires you to

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ware.) The program does feature a special composite video mode that allows an increase in apparent resolution and 16 simultaneous on-screen colors on composite color monitors.

Executive Picture Show

Executive Picture Show, introduced roughly 2 years ago by PCsoftware of San Diego, was one of the first packages of its type. While it is stuffed full of small programs and utilities and the whole functions together smoothly, it is upstaged by some of the newer packages which offer many more features.

more teatures. The package's initial screen gives you a choice of several program modules. Draw, Graph, and Vector, which allow you to build and edit various screens and charse ress, Create, which lets you organize stide errors, Create, which lets you organize stide stopped to the program of the program of slide shows in real time. A screen-grabber and a run-time slide-show module function as separate programs and run from the DOS normor.

Using Executive Picture Show is tricky.



When you use the Draw module to paint the screen, you control the graphics cursor using the cursor keys. Mouse support, for any of the three-button Mouse Systems products only, is built in, but Mi-crosoft Windows-like pull-down menus

The pækage includes all of the most frequently used free-form drawing commands such as dots, lines, circles, arcs, and boxes. You can move, copy, and crase sections of the screen individually, as well as fill objects with solid colors or a selection of natterns.

are not.

Several typefaces are available for text sides. You can edit or add individual characters or even whole fonts at any time. Typing options permit you to change to angle of text on the screen, the size of characters, and the slant of the italic characters. Larger characters appear in outline, and you can fill them with solid colors or patterns.

The Graph option, available through the main menu, allows you to quickly create business charts in your choice of seven styles, including line, bur, horizontal bar, stacked bar, 3-D bar, surface diagram, and pie charts. Unfortunately, since the program cannot import any data, your must enter the data for charts manually in response to a prompted template.

A nice feature of Executive Picture
A nice feature of Executive Picture
Show is that it allows you to create interactive slide shows—though you pay a price
ask questions and branch to different displays depending on the response. Most
choices—such as screen colors and type of
transition—are prompted, which is nice
because you don't have to remember a lot

of commands and you can see the results of your selection immediately.

You can start slide shows from the main menu, using the Show option. To view individual images, you can start it from the DOS prompt

Executive Picture Show provides a wonderful aid for making floppy disk copies of your show to distribute. You meetly execute the Maderun program at the DOS prompt and tell the program which show you want to put on a floppy disk; the program then copies all the necessary programs and images to the floppy disk.

The screen-grabber utility, called ScrnGrab, compresses text or graphics screens when it saves them to disk. Text files, nominally 4K bytes long, can sometimes be compressed down to 500 bytes; typical 16K graphics screens Can squeezed into files between 3K and 12K long. Although Executive Picture Show treats text and graphics screens differently in editing, a special utility converts text disolava into graphics files.

In addition to video displays, Executive Picture Show will also put images on paper using a variety of printers and the Polaroid Palette.

To create animated sequences, Executive Picture Show buffers images to RAM. An unusual feature is that the package requires you to assign memory to these buffers by running a utility before entering the main program.

PCsoftware supplies a small library of predrawn images as an option at \$35 apiece. Four disks were available at the time of this writing, and they contained borders, full-screen pictures, maps, and icons.

The modular nature of Executive Picture Show keeps is memory requirements down—only 256K of RAM is required—and the program will run with few problems on dual floppy disk systems, performance. The program also seemed a bit more sensitive to microprocessor speed a bit more sensitive to microprocessor speed and most and benefits greatly from a high-speed computer. Although Pictoflware claims that the program will run on any graphics monitor (including mono-controlled).



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drives, CGA or EGA compatible or Paradis monochrome graphics display; DOS 2.0 or later. In Short: Video presentation graphics package that includes free-form drawing, graph-

ics, sitie-thow organitar, screen-grabler, and rus-time module deitor limited to COA colors and resolution. It supports a variety of dot matrix and ink jet printers, as well as the Corona LaserFiniter, the HP LaserFiniter, the HP 1475, the HP ColorPro, and the Sweet Pea Six-Shooter potters, and the Polaroid Palette film recorder. Not copy protected. CRUS BRIDGE SUSS SIRKE COUNTY.







On the surface, all of the programs reviewed in this article work like to fine interesting equivalent of 35 mm like projector. Certural to all of them is the shifting to regarde a sequence of image is that can be painted across a tentor of the control of the second of

ExecuVision

Not just a pioneer in presentation graphics, Visual Communications Network claims to have actually coined the term 2 years ago with its introduction of ExecuVision. The graphics program was designed to create bright, colorful, impact-generating onscreen images and limited animation using IBM's medium-resolution Color Graphics Adapter.

Compared with more recent products—and in particular its high-powered offspring, Concorde—ExecuVision is as primitive as its age would imply. Essentially, it is a painting program enhanced with a slide-show sequencer. It even lacks features that are expected as standard equipment today—for instance, a screengrabber.

The program terms itself a "fivepbase" system based on its initial meulection: Create, Prepare, Print, Run, and Qui. The center of the program is the Create pbase, which allows the free-form drawing of pictures, et ac charts, or graphs using both a menu-selection system and the cusror control leys. Prepare organizes slide shows and is able to handle limited animation. Run actually displays the shows in real time. Print makes hard copy of Executivision images, and Quir returns

you to DOS.
The graphics feature of Create is primitive. For instance, it cannot import data directly from spreadsheets. Moreover, the

nine type fonts used for text charts are all monospaced. Controlling the program is somewhat cumbersome since you must use long series of keystrokes and learn many key combinations. Yet, with pa-

tience, ExecuVision will produce sharp, attention-getting images. ExecuVision's greatest strength is its optional library of predrawn images,

optional library of predrawn images, which resides on 16 floppy disks. Unlike those of most libraries, the images in the VCN database are large and highly detailed—probably the best available today in medium-resolution CGA mode. Many of them take un the entire screen.

ExecuVision includes facilities (in Create) for cutting and pasting images, as well as changing their size, orientation, and

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even their color. Included in the database are a number of borders, maps (including city road maps of many major American cities), city skyline views, and thematic subjects. The image database would be reason alone to buy ExecuVision-were not the same library included as part of Concorde.

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ers and plotters. Copy protected.

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Concorde

Visual Communications Network's Concorde pushes beyond ExecuVision into the realm of high resolution, simplifies operation, and adds as standard features many of ExecuVision's options. The new program takes advantage of the 64 colors on IBM's Enhanced Graphics Display and allows you to blend charting, painting, text slidemaking, image capturing, and automatic interactive slide-show capabilities. It includes its own image library and can also make use of images developed under ExecuVision or included in that program's library

Concorde's four modules, called Create, Produce, Show, and Capture, are unified by a single master program and a common data structure and user interface. The user interface, based primarily on a horizontal bar menu selector similar to the command structure of 1-2-3, allows you to select individual functions either by mov-

COMPOSITE VIDEO OUTPUT: FROM THE PC TO THE BIG SCREEN

Once you've put the time and effort into creating an animated presentation, you'll want the world to know about it-or at least make a presentation to a wider audience than the one that fits around your PC's monitor.

Luckily, all of the presentation graphics systems reviewed here can generate a composite video output when you use them with a CGA-standard video adapter. This means that you can project the changing video displays to large audiences using standard video projection systems or Kodak's DataShow overhead display system. You can even record and

distribute the video output of these packages with any videocassette recorder. Beta, VHS, or compatible system. The key to the video compatibility of

these programs is the IBM standard Color Graphics Adapter, which is the only IBM display adapter that provides a composite video output. This signal, which you access via the round RCA pin-plug jack on the CGA retaining bracket, roughly approximates the National Television Standards Committee (NTSC) specification for video signals that is used by nearly all North American and Japanese video systems. (Other parts of the world have different video standards.)

The pictures made with the composite signal will not be as sharp or colorful as those appearing on EGA monitors when an EGA card is used. EGA cards, however, do not generate signals compatible with the NTSC composite video standard

NTSC video signals will display on any standard video monitor or projection system and can be recorded by most videocassette recorders (VCRs). Using this software, therefore, you can create a slide show on your computer, record it on your VCR, and distribute the entire show on tape all across the country. The tapes can be played back on any video recorder of the same format without a computer system.

Alternatively, you can plug the composite video output of your CGA card into a video distribution system-for instance, a corporate video system. Using a modulator, a composite video signal can be converted into an ordinary television signal-for instance, that of a broadcasting channel unused in your area-and connected to a television set or cable television system.

One problem you might encounter is that because of the CGA's loose interpretation of the composite video standard. some monitors, video recorders, and similar equipment react badly to the output put of some CGA cards. (The output from the IBM Color Graphics Adapters I've tested varies widely from the commercial video standard.)

In some cases, a video processing amplifier can improve incompatible CGA outputs by taking apart video signals and reconstituting them in a very controlled fashion. However, professional-grade "proc amps" are expensive. Another alternative is better consumer-grade video enhancers: these often have their own internal video processing amplifiers built in, which can help clean up a CGA signal and make it more widely compatible -Winn L. Rosch

ing a highlighted block over the desired typed in or imported from 1-2-3 (Release IA and 2), Symphony, Multiplan, and DIF file formats. You can even edit the imported numbers using a spreadsheetlike interface.

> Plotting a chart merely requires you to specify a data file or enter numbers, describe the chart (bar, line, pie, and so on),

feature using cursor keys or by typing the first letter of the menu name describing that feature. Rudimentary mouse control is built in, but Concorde does not use nulldown menus. The Create module can automatically

generate charts using data that's directly PC MAGAZINE # MARCHIO, 1987

THE INTELLIGENT CHOICE...



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- 10MHz, 70MB MonoGraphic System \$2295 70MB fast access (28 ms) MiniScribe hard disk.
- SpeedStor partitioning software High resolution monochrome graphics adapter card
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Presentation Graphics Software: Summary of Features

Product/ Manufacturer	Show Partner Brightbill-Roberts	Executive Picture Show PCsoftware of San Diego	PC Storyboard IBM Corp	ExecuVision Visual Communications Network	Concerde Visual Communications Network
FEATURES					
List price Vector graphics capabilities Rester graphics capabilities	\$79 O	\$245	\$275 •	\$395 ○	\$695 •
Generates graphics from data imports data from other programs Edits graphics produced from other programs	•	Of •	•	•	:
Has clip-art files No. of fonts available Preprogrammed slide shows	● 20 [‡]	13	4	0 11	17
User-definable alide shows/animation Branches based on user responses to prompts Customized sound	:		•	• 00	
Screen-capture routins	•	•	•	0	•
HARDWARE SUPPORT/OPTIONS					
Hercules EGA Mouse	:	0	0	0	:
					THE R. P. LEWIS CO., LANSING, MICH.

n 2.0 will have vector graphics cap on 4.0 will import data fr Fifther apparatus front author

and enter captions and titles. You can specify legend locations and numeric fields by typing in coordinates or interactively using the cursor keys to mark off the appropriate on-screen area.

The Create module also allows you to prepare text slides. The process is almost as easy as typing into a word processor. You need only position the cursor and type away; you can even relocate whole lines of text if you like.

A repertoire of 15 high-resolution or 15 medium-resolution proportionally-spaced typefaces ensures variety of your text. Text features also include your choice of character size and color, text orientation (rightside up, upside down, and parallel to the left edge of the screen or right edge), shadowing, underlining, and character tilt (for italics).

Concorde does offer paint capabilities, but they are very limited in scope: they include only a few graphics primitives for drawing basic shapes and allow such basic functions as moving and erasing blocks of text and sketching. Concorde's drawing abilities are constrained to brush (line

drawing) and spray (random dot) techniques, both of which you can operate using the cursor keys. Colors, drawing modes, stroke weights, and spray densities can all be selected through menus. You can magnify images for fine editing, as well as rotate, reverse, move, and copy shapes and screen areas.

Concorde's screen-grabbing Capture function is compatible with 80-column text and graphics modes and can grab images made with video digitizing systems. After it has been loaded into memory at the DOS prompt, you invoke the capture function by pressing the Shift-PrtSc key combination.

Concorde's Produce function gives you a blank form in which you fill in the name of the image you want displayed, the type of transitions, how long you want it displayed for, the amount of time for the transition, and the location of the image on your screen. As with Concorde's Create function, Produce lists your choices and lets you select from them using cursor keys. When you must specify a screen location, you can either enter coordinates or find the right location using cursor keys. You can preview each transition or the whole show as you go along.

Produce includes a programming-language-style capability that lets you add tunes (derived from the PC's single-voice

Creating With Pictures **Just Got Easier!**

Professional Image Board

The new Professional Image Board is a PC board which allows an ordinary home video camera (color or black-and-white) to be plugged into an IBM personal computer or IBM compatible. Now, live, fast action scenes can be instantly captured in full color and frozen. The frozen pictures can be computer enhanced feature by feature and stored on a floppy or hard disk. The frozen pictures can also be transmitted to any remote computer in the

ard disk. The frozen pictures can also be transmitted to any remote computer in the world via modem. The Professional Image Board also allows you to perform cut and paste operations with most popular software.

SPECIFICATIONS

- Works with IBM PC/XT/AT or compatible
 Capture one picture in 1/60 second from standard NTSC signal source (Regular video camera, VCR, etc., or RGB camera)
- Shows picture on analog monitor or TV
 Resolution 512 x 256 capable of 32K
- Resolution 512 x 256 capable of 32K different colors
 Adding text on the captured picture
- Mixing external image with internal image in live mode
- Image captured by PIB can be displayed on EGA monitor
- Adapter available for European standard TV



Unretouched frozen video image in fuil color. Captured with ATronics' Professional Image Board.



1830 McCandless Dr. Milpitas CA 95035 (408) 943-6629 oscillator), color and fill images, type text on the screen, and interactively react to responses typed at the keyboard. The latter allows presentations to branch to different displays based on the viewer's response—a feature very useful for computerized training exercises.

Show is Concorde's run-time module. It will automatically display the images drawn or captured by the other elements of the program independent of the original modules following the instruction you wrote using Produce.

Concorde can also function as an ordinary hard-copy-type presentation program and will generate overhead or 35mm slide

images. Concorde's biggest asset is its image database, which is derived from ExecuVision's optional database but is included with Concorde as a standard feature. In addition to the ExecuVision medium-resolution images, Concorde includes one disk each of high-resolution graphics and ani-

mation libraries.

Each module (except memory-resident
Capture) of Concorde is large—roughly
200K bytes—and the whole package aquires nearly 2 megabytes of disk space.
Capture eats up 56K of RAM. Running
Concorde with medium screen resolution
requires 384K of RAM; high resolution
takes a full 640K. It's comparable with





Concorde Visual Communications Network 238 Main St. Cambridge, MA 02142 (617) 497-4000 Llst Price: \$695 Requires: 384K RAM

Requires: 344k RAM for medium resolution (640k RAM for high resolution), CGA, EGA, and Hercules monochrome graphics display, DOS 2.0 or later.

In Short: A high-priced all-in-one graphics

package for hard copy, automatic interactive slide shows, and presentation graphics that is most notable for its image database. It supports a variety of dot matrix and laser printers, plotters, and film recorders. Not copy

ers, plotters, and film recorders. Not cop protected. CROSE 674 ON PEACER SERVICE CARD



Show Partner

If you shop by price alone, Brightbill-Roberts/The Marketing Channel and Co.'s. Show Partner, Version 2.0, is the best buy. But don't let the low price fool you-Show Partner has the most advanced, easiest-to-use interface of the currently available video animation programs. Its animation abilities are second to none, and it supports nearly all standard PC graphics systems, including the EGA. It's proving itself to be the foundation of a whole system of hardware and software add-ons. Show Partner lacks only built-in charting, but that's no problem because you can easily import artwork from other programs. In fact, the only reason not to buy Show Partner, Version 2.0, is that you can get it free with the Microsoft Mouse, some AST graphics boards, and Kodak's DataShow.

IBM's CGA or EGA, Hercules Graphics,

and AT&T color systems.

The program is big, and, although it's ponderous to use when producing, it's ponderous to use when producing, it's quick during presentations. On the one hand, its strongest points are its consistent interface and file structure, large image library, and many features. On the other hand, it is both expensive and copy protected, do not by the most and the program of the

CONCLUSION With one of these packages, you should be able to put enough sizzle into "our presentations to not only keep your audience awake but to make your presentation memorable. 28

Winn L. Rosch is a contributing editor of PC Magazine.

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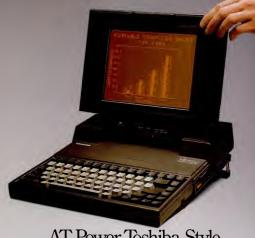
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When you reduce the price of an 8-package accounting system from \$4,800 (or \$600 a module) to \$199 for the complete set, people are bound to ask estions. Here are some of the most popular ones we're hearing at Peachtree: Q. How can we afford to sell Peachtree Complete at such a low price?

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We've also streamlined order processing and reduced overhead. It is faster and easier to buy our product Peachtree has long been the first name in accounting software, so we've had time to completely amortize our original development costs plus make over 100 major additions. These

enhancements include multi-company capability, menu driven installation and removal of copy protection. Consequently, you're getting a proven product at a better price.
We also "unbundled" support (so

you only pay for what you need when calling our toll-free technical support hotline) and established a network of local dealers to serve as Independent Peachtree Support Centers. Q. What does Peachtree Complete

A. I. Eight Integrated Software

Modules:

- 2. Installation Guide to lead you step hy step through our simple installation procedure. 3. Accounting Primer, written for
- Peachtree users by an industry expert, to explain accounting 4. Tutorials on each module with
- sample data to make learning 5. A complete Reference Library
- with detailed instructions in plain English on all software functions. Q. Is Peachtree Complete really the same product that used to sell for \$600 per module

A. Peachtree Complete is basically the same accounting system that both

Call Now to Order or for a Dealer Near You



Peachtree and IBM sold for about \$5,000 but with substantial improve-

ments in function and presentation. Data files built with previous versions of the system are compatible, so many users are upgrading to Peachtree Complete to take advantage of the new

features and benefits With more than 150,000 users to its credit, Peachtree Complete has been the PC World Class Winner in its category for two of the last three years. O. What's the difference between

Peachtree Complete and the \$69.95 A. Peachtree's system is called

Complete because it contains the eight most needed accounting packages (including payroll) and all reference materials for one price. Remember, it was designed as a \$4,800 accounting software system.

The \$69.95 systems, on the other hand, are incomplete. They were designed to sell for \$69.95 and require the purchase of additional modules to be comparable-payroll, \$49.95 more: tutorials, \$19.95 each; etc. Everything is

O. How soon will I outgrow the

system A. Peachtree Complete handles revenues up to \$21,000,000, so only the largest companies will outgrow the system. The ability to process data for at least 50 individual companies is one of the system's higgest seiling

The new optional multi-user module allows Peachtree Complete to be installed in a local Area Network, and Peachtree Data Query, for just \$199, lets you quickly transfer your accounting data to many popular spreadsheets and datahases, as well as produce custom reports O. What if I'm not satisfied with Peachtree Complete? A. When you purchase Peachtree Complete directly from Peachtree Software, you're protected with a 30-Day Money Back Guarantee (an option even the most expensive accounting products don't

If you're not satisfied, simply return the complete product in saleahie condition within 30 days and your purchase price will be promptly refunded. For full detalls on our support plan and money-back guarantee, call the toll-free telephone number below.

PC Magazine Best of 1986 "Kudos to Peachtree, which woke up one morning and decided that its eight integrated accounting software modules, which the day before had sold for \$600 each, were at \$4,800 for the set, just a tad overpriced and so cut

the price for the whole set down to \$199—a pretty good discount in anyone's league." —Jim Seymour, contributing editor of PC Magazine.

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COVER STORY GLENN HART

SPECIALIZED GRAPHICS SOFTWARE The Quick And Clean Solution

general
practitioner is not the best doctor to
approach for plastic supery. Similarly,
a general-purpose charting program
is not your best bet for your
specialized graphics needs. Generalpurpose programs either cannot create
organization charts, Gant charts,
flowcharts, and test-only charts
without a rear deal of difficulty or

cannot create them at all.

While an organization chart is a common business graphic, it presents difficulties for many programs. Most graphics packages translate numeric data into a graphic representation; it is the shape of the graph that conveys the point. Organization charts, however, aren't numeric, they're positional. With them, it's not the shapes but

If you need specialized graphics such as organizational, Gantt, flow, or text charts, you could be shortchanged by a general-purpose graphics package. The six products reviewed here will give you the best possible output in one or more of these specialized areas.



The beauty of Diagram-Master is that you can load organization or Gantt charts that you have already prepared from other subsystems into the Drawing Board subsystem for further enhancement.

their positions on the chart that convey the message-the hierarchy of superiors and subordinates that makes up the structure of a business. Specialized packages allow you to enter positional information into data entry screens or menus, saving you the trouble of drawing and aligning boxes, centering text, and so forth-if your package even has drawing capabilities to do that Another type of chart with unique

graphic properties is the Gantt chart. Although it resembles a bar chart on the surface, it deals with time rather than values. Gantt charts, which measure the duration of individual activities in order to help you track them, are often created by project management software. However, they are relatively uncommon in general-purpose charting packages.

Text-only charts aren't particularly complex, but they can be dull if not prepared with creativity and care. Packages that specialize in this type of chart provide a wide variety of type fonts and sizes, as well as icons, to enliven your charts. Flowcharts represent program steps, systems operation, and the like. They use a system of conventional symbols developed over the years, with each shape conveying the nature of the operation illustrated. If you understand the symbology, flowcharts can be a highly effective method of documenting program logic. Flowcharts can also be used to track nonprogramming activities in business and other areas. Again, flowcharts are almost nonexistent in a general-

purpose package. If you need one of these specialized forms of charts, consider the packages reviewed here. Though limited, most give you the best possible output in their specialized areas

Diagram-Master

The Decision Resources (recently acquired by Ashton-Tate) family of business graphics tools-which includes Chart-Master, Sign-Master (both reviewed elsewhere in this issue), and Map-Masterhas long been one of the best-selling groups of graphics programs. Diagram-Master, the newest member, will undoubtedly follow in the family tradition. It is a specialist that produces organization and



Gantt charts, and has a few extra tricks as

Diagram-Master consists of three major subsystems. The first is a Drawing Board, a chalkboard on which you can place text; draw a variety of geometric entities, such as boxes, polygons, circles, ovals, lines, and arcs; and import symbols from a library of 101 symbols, including grids, balloons, and flowchart symbols, You can also easily draw and save your own symbols.

Within the Drawing Board, you have good control over entity characteristics: You can choose one of eight colors, eight line types, 16 thicknesses, eight hatching patterns, eight arrow sizes, and eight arrow types. Strangely, you can't create a normal line arrow pattern. Seven highquality text fonts and a font with a variety of useful symbols are also available. You can also zoom in and out, shrinking an im-

age or enlarging it to fill the screen. The second subsystem allows you to create organizational charts. To do so, you answer a series of prompts, and Diagram-Master automatically draws appropriate boxes and interconnecting lines. You can define multiline titles, have full control over font, type size, justification, and color, and choose from four variations of chart layout. A nice feature is that Diagram-Master lets you preview the finished

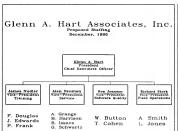


Diagram-Master includes three subsystems. One allows you to create organizational charts, giving you fall control over fonts, type sizes, justification, and colar; you can alsa choose from four variations of chart layout. The second subsystem produces Gantic harts, allowing you to specify time periods, time divisions, number of activities, and more. The third is a drawing program into which you can import and enhance charts propared with the other two subsystems.

chart on the screen, saving you quite a bit of plotting time.

The third subsystem produces Gamt charts and works similarly to the organizational charting subsystem, though the greater complexity of its time line graphics means there are more decisions to make specify the time periodis to use, how many time divisions to show, how many activities to include, how to differentiate the various bars, and more. The process you use to draw the actual bars is similar to that used to decision to the control of the to draw the actual bars is similar to that used to the process. You musk the state of the process of the sort to the end, and then mark it.

ENHANCING CHARTS The beauty of Diagram-Master is that you can load organization or Gantt charts that you have already prepared from other subsystems into the Drawing Board subsystem for further enhancement using all the tools it provides. You can draw lines, add text blocks, insert library symbols, and so on. This caability adds vet another dimension to the already fine charts that are produced auto-

matically.

The excellence of the basic structure of Diagram-Master is marred somewhat by incompleteness in some areas and several poculiarities. One incomplete aspect is that the installation procedure only accepts drives A: through D:. The configuration life, however, is an ASCII text life that you can easily change to make the program sales on any hard first. Install. The installation of the configuration of the configuration of the configuration of the southeast of the program sales on any hard first. Installation of the configuration of the south de documented to first part of the program sales of the program sales of the southeast of the

Diagram-Master supports CGA, PGA, and Hercules video adapters but only partially supports the EGA standard. It uses CGA graphics in most operations. Although EGA is not mentioned during in-stallation, if Diagram-Master determines that EGA is present, it will use its higher-resolution mode for full-screen previews. Given Diagram-Master's high price, full support of the popular EGA should be provided. Also, the program supports a light probability of the program supports along the the program support along the program supports along the program support along the program support along the program supports along the program support along the program support

natural for Diagram-Master because of its drawing capabilities, and the next release of the program will likely support it.

Peculiarities of Diagram-Master include the following: the Rotation commands set North, rather than East as most programs do, as 0 degrees. Most users will feel that 45 degrees should slope up to the right, not to the left as it does with this program. A diagram library stores a brief description of images, but you can only list them in the forward direction. If you miss a name or want to end your scan without looking at all the names, you cannot move back a page. Another perplexing problem that occurred was that I lost a saved image; it appeared in the disk directory, but Diagram-Master couldn't retrieve it. It turns out that you can't use DOS commands to manipulate files outside Diagram-Master because the program doesn't update its internal listing of the files with the changes made in DOS.

Screen painting is noticeably slow, espections set no speed records either, even on an AT running at 10 MHz. Diagram-Master is written in compiled BASIC, which may not be the theoretically "correct" language for a graphics program, but you can't argue with the quality of the results.

When I tried Diagram-Master on a system with a standard plotter, everything worked as advertised. I did, however, have trouble getting the program to work with my Laserjet Plus, but I have an unusual configuration. Decision Resources' technical-support staff gave me a rather nonobvious sequence of commands to work around the difficulty.

Finally, Diagram-Master uses the annoying SoftGuard method of copy protection that places hidden files on your hard disk if you want to run the program without a key disk. Decision Resources told me it plans to remove the copy protection in the future.

For all its shortcomings, the final proof is in the output quality Diagram-Master delivers. The organization and Gantt charts were very attractive when output with a laser printer and a plotter. The output was as lovely as that produced by presentation and business graphics programs. The control you have over color, font, element size, and other characteristics makes

the charts much more interesting than those produced by some other programs, and the ability to dress up the output with symbols can make the difference between yet another dull chart and an arresting graphic presentation.

Diagram Master is costly and has some rough edges that definitely should be cleaned up. Nevertheless, it is unquestionably functional and effective, combining ease of use with very fine results.

Diagraph

Diagraph, from Computer Support Corp., is a graphics package that allows you to create organization charts, forms, signs, word charts, flowcharts, and other presentation aids in an unusual manner. You create the images using a large assortment of typefaces, lines, and symbols included in a library of more than 2,200 standard symbols and several thousand optional ones.

Text features are very strong. Thirteen typefaces are standard, and you can purchase 24 more as options. You control text size, bold or italic emphasis, justification,



FACT FILE



Diagraph
Computer Support Corp.
2215 Midway Rd.
Carrollton, TX 75006
(214) 661-8960
List Price: \$395; optional symbol libraries: 24
typefaces, \$25 each;

Holidays and Seasons, \$59; Pictornals, \$59; Portrait Gallery, \$59; Agriculture, \$79; Vehicles, \$79; Electronics, \$79; EDT Equipment, \$79; Anatomy, \$59; U. S. Mags, \$59; Space, \$599; Pipe Fittings and Valves, \$129; Pulp and Paper Process Flow, \$129; Chemical Symloks, \$120

Requires: 512K RAM; two disk drives: CGA, EGA, Hercules monochrome graphics display or Tecmar Graphics Master adapters; DOS 2.0 or later.

In Short: Diagraph allows you to create text charts, organization charts, and other graphies with a large number of typefaces, lines, and a library of 2,200 symbols. It supports a variety of plotters, film recorders, and dot matrix, laser, and ink get printers. Copy protected.

PC Magazine

DIAGRAPH

Computer Support Corporation Sample Symbols







For creating presentation graphics, Diagraph comes standard with an impressive array of 2,200 symbols. You can manipulate the symbols by scaling, rotating, and aligning them. The package also includes a large assortment of typefaces and line types.

proportional spacing, and more. You can draw lines in any of nine line types, connect symbols, and add any of 47 "tokens" (arrowheads and similar symbols).

The standard assortment of symbols is uvery impressive, and includes accents, are crows, banners, boxes, geometric shapes in 2-D and 3-D, bordres, stars, icons, signs, icolouds, trees, and skylines, as well as organization, flowchart, office layout, netpowck, and other symbols. Many of the optional symbols are stunning, too, pespecially libraries of anatomical, comput-

er equipment, and mapping symbols. You can manipulate any symbol in a number of ways, including scaling, rotating, and aligning. You can shade them using 250 patterns.

Although you can use all of these features and symbols to produce a wide variety of charts, some types of graphics are easier to produce with this package than others. For example, while it's easy to design organization charts, so many steps are necessary to make a pic chart out of individual symbols that you would be better off using a standard business graphics package for common business charts.

Since Diagraph is unable to import images from any other packages, you can't use it to enhance external images (as you can with, say, Freelance), but it does such a good job of creating its own attractive

images that many users may not care. Installing Diagraph via the batch files provided presents no problems other than those presented by the SoftGuard copyprotection scheme. Diagraph supports a good number of matrix, laser, and ink jet printers, plotters, and film recorders. You can use CGA, EGA, Hercules, or several HP video adapters and appropriate monitors. The program runs much faster if you have an 9807 or 90287 math corrocessor.

Diagraph runs under a front end called Computer Support Applications Manager (CSAM), which you must use to boot up the program; it is used by all programs from this vendor. CSAM searches the disk drives you specify and even searches through all the subdirectories on those disks in order to find and boot up the pack-



If you own two or more PCs then you need Easy LAN'T

THE EasyLAN OFFICE NETWORK

EasyLAV shares printers and disk drives between 1BM PCs. EasyLAV can save you \$1,000 or more per PC by eliminating duplicate equipment purchases. And now, you can rule NETBIOS supported applications. Or you can write your own network applications for EasyLAV and other NETBIOS com-

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- EasyLAN shares printers, plotters, data, and disk storage
- Supports up to 18 PCs or compatibles
- New Network Commands
- New NETBIOS
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- Print spooling
- PBX support
- Easy to install
 Easy to operate
- Modem support
 Performs in the background

EasyLAN's low price matches the small business user's cost-sensitive budget. It is the office network solution for less than \$100 per PC.

EssyLtN performs its operations concurrently in the background. EssyLtN communications, file transfers and printer operations all take place white each PC simultaneously performs such normal DOS applications as Lotus 1:2:3," Wordstar," and dBASE."

NEW NETBIOS SUPPORT—WRITE YOUR OWN COMMUNICATIONS PROGRAMS.

Programmers may use EasyLAV to develop network applications using NSTBIOS (interrupt Sc). Three applications can now be operated across the law cost BS 232 communications. Innix used by EasyLAV. Our new EasyCALEVIAK program is an example of a network application that uses NETBIOS for program to program to program to program to program.

Multi user data-base management applications that require a high overhead network operating system will perform faster on high cost networks operating at mega

NEW VERSION 3.0 COMMANDS EXPAND

NETWORK PLEXIBILITY
EECLOWK lets PC's attached to the network read the time and date from a single master clock on the central PC eliminating the need to install individual clock boards in each PC and insuring that all life entrees and updates

made across the network are dated.

The EZ Make Directory and EZ Renove Directory commends function identically to the DOS MKDIR and RMDIR commands, and give remote users increased flexibility.

commands, and give remote users increased flexibility when it comes to managing subdirectories on the central PC EZBEEP lets you send on audible signal across the network, diertims a PC user that a life or message is being

EasyLAN PBX SUPPORT BRINGS NEW

PLEXIBILITY TO PC CONNECTIVITY th Eurol AVs PBX support, users can share perp

with Early, Av P.D. Support, user can state perspire also and transfer files using PBX switched circuit controtions and existing twisted pair wring. Early, EAV, Awa alreach been installed on a number of different PBX's, and recently was certified by Northern Telecom for use on its Mendian BL 1.

EasyLAN—Networking With Netbios Support. And it's Only \$99.95 Per PC.

The value is high QQQ Q

Disk sharing uses EasyLAV's EZCOPY command to move files to and from PC's. ASCH or binary files can be transferred in the foreground, or in the background while other DOS programs run.

Printer sharing operates transparently with existing programs. Print files are automatically spooled to disk and scheduled for printing. Multiple printers on the central PC may be designated for individual printing tasks.



Eusgi. 17 Office Networ

EasyLAN SPECIFICATIONS Each PC in the network requires an individual li

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Address

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Name or

censed copy of the RasyLAV program and takes 20% of memory on each satellite PC, a serial port and DOS 2.0 or above RasyLAV runs on all IBM PC models and compatibles: The central PC requires a suital port for each satellite PC. The COM2 and COM6 boards are serial port to expansion boards which per nit you to add serial port expansion boards which per nit you to add serial port expansion boards.

EASY TO INSTALL

EasyLAV can be installed in less time than it takes to enjoy your coffee break. Just plug the EasyLAV cables into existing serial ports. The EasyLAV Network Configuration Program provides menu driven installation program that will guide you step by-step through the software installation process.

EasyCALENDAR—USE YOUR NETWORK TO

The first ol a new series of Zinji network application products using NETBIOS is now available. Europeauch using NETBIOS is now available. Europeauch applications in distribution or department and can be run on personal computers attached to any NETBIOS-compatible network.

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to do hists
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transactions to the central data base to invoke Easy-CALENDAR functions

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age. Unfortunately, unless you specify the drive on which the package is located, CSAM spends an inordinate amount of time finding the program.

The package operates using a series of inerarchical menus. You give commands using only eight function keys (presunably for compatibility with HP compers), but the meaning of each key changes as you proceed through the menus. To make things easy for the user, the program always shows the current meaning of each key at the bottom of the screen.

The manual includes a fine interactive tutorial and clever minilessons and exercises for specific applications, but most of the documentation consists of pictures of the plethora of symbols. A competent online, context-sensitive help system fills in the gaps.

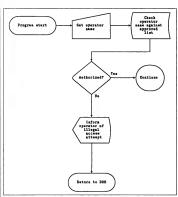
The extensive standard symbol library sets Diagraph apart from similar products. You can spend a lot of money if you add many of the optional typefaces and symbol libraries, but the quality of the results you can obtain is first-rate. Diagraph is flexible, potent, and fun to use.

EasyFlow

Flowcharts were developed to represent software operation and systems graphically and are one of the best methods of documenting how a program works. The wholes used in them, such as those for the hardware components (keyboards, disk drives, and CPUs) and the software operations (decision and subroutines), have been standardized by convention. In addition, some businesses have adopted ion, some businesses have adopted oncharts to represent the flow of their activities.

Traditionally, flowcharts have been drawn by hand, by tracing the necessary shapes from a template and filling them in with text describing the operation. This method of preparing flowcharts is tedious, especially because they usually require many stages and modifications.

EasyFlow, from HavenTree Software, is a graphics program that greatly simplifies the process of flowcharting. It enables you to place any of 36 common shapes, many of which come in three sizes, anywhere in a fixed matrix that the package defines. This matrix assures that items of



EasyFlow greatly simplifies the process of flowcharting. You can use up to 36 common programming symbols in your charts. Once you place a shape you enter the text that will go inside its the package admonstically centers and positions the text. EasyFlow then automatically draws connecting lines between shapes, indicating program flow.

varying shapes are aligned properly. Once you place a shape, you can enter the text that will go inside it. Then EasyFlow automatically centers and positions the text for best appearance. Or you can override the default placement and place the text where you want it.

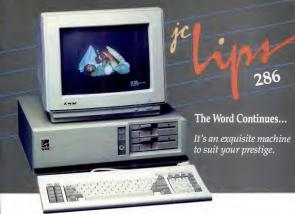
you want.

EasyFlow also automatically draws connecting lines between shapes, usually with arrows indicating program flow.

Once again, you can override the program and control the placement of the connecting lines by indicating the starting and entitle the program of the pro

tle for the chart, and define blocks of text or lines that you can place anywhere on the chart.

LOTS OF WINDOWS EaryFlow divides the screen into several windows, giving you a screen layout that is well thought out and unclustered. There's the main screen area, which displays your flow-windows area, which displays your flow-windows area, which displays your flow-windows area, and the screen area, which displays your flow-you of whatever is under the program's "shape cursor," another window displaying message text and instructions or optons, and yet another one providing satus information. Zoom-In and Zoom-Out commands magnify or reduce the portion information. Zoom-In and Zoom-Out commands magnify or reduce the portion. In addition to its windowing feature, In addition to its windowing feature,



JC LIPS 286 is a 10 MHz power box. It is astonishingly fast, powerful, and does not compromise performance in any way. While offering all this performance, you will appreciate its smaller foot print. Our third generation personal computer brings you technological advancement and features which have not been possible in the past. It runs all popular IBM PC or AT software much faster than other compatibles. It will impress you with unsurpassed performance and cool reliability.

IC LIPS 286 features the advancedtechnology Intel 80286-10 processor running either at 10 MHz or 8 MHz CPU clock speed switchable on MAS. fly. The systemboard has 512K of RAM. expandable to 1Mb, a built-in high density floppy disk controller, a socket for Intel 80287 co-processor, and 8 I/O expansion slots. Also included are a 1.2 MB floppy disk drive, two serial interfaces, a parallel interface a, battery backed up clock and configuration RAM, a high quality AT-style keyboard with tactile feedback, and a 200 watt power supply.

JC LIPS 286 gives you two options in display. The JC ST-1410 is a high quality 14" high resolution monochrome monitor

in either Amber or Green, with dark background non-glare screen and a tilt and swivel base for easy viewing. The multi-function display card provides an IBM PC compatible interface for a monochrome display with Hercules compatible graphics or a RGB color graphics display.

> For Enhanced Color Graphics capability, the JC EG-767 offers a high quality 14" display in 0.31 mm dot size with an optional tilt and swivel base. The Enhanced Graphics Adapter for this monitor provides multi-function display mode in color-graphics or mono-graphics. IC LIPS 286 is also available with a high

speed 20 Mb or 32 Mb hard disk with

cache buffer memory controller, high performance Local Area Network board, 1200/2400 baud modem board, and more. These options can be added at anytime, and with the features we supply as standard, it will be a difficult system to outgrow.



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SPECIALIZED GRAPHICS SOFTWARE



EasyFlow provides other nice touches and benefits for its users. Overall, the user interface is straightforward and easy to learn and use. Function keys, with a few Alt-key sequences thrown in for good measure, perform most of the program's commands. There is also the ease with which you can modify and edit existing charts, Cut-and-paste commands allow you to delete, move, copy, and even rotate or reflect individual and groups of shapes you select. And you can compress charts either horizontally or vertically by removing redundant white space, control page breaks, and other output details.

You can also use EasyFlow to define organization charts, with two special shapes provided for this purpose. The interactive nature of the program lets you see what your chart will look like sooner than a menu-oriented organization chart program, but EasyFlow isn't as powerful as some programs specifically designed for organization charts. For example, it draws boxes and connecting lines but doesn't automatically create the levels that are intrinsic to an organization's concept of superiors and subordinates.

There are some limitations with the program. There's only one text font, you have little or no control over font size, and the display doesn't use color to differentiate things, though you can specify the foreground and background colors on an EGA and can specify the pen to use for each shape if you're using a pen plotter.

EasyFlow automatically determines whether you have a CGA, EGA, or Hercules graphics adapter and adjusts its operation accordingly. It supports several IBM, Enson, and Okidata matrix printers, the HP 7475 plotter (which means many HPGL plotters will probably work, too). and the HP Laseriet and Laseriet Plus laser printers. Special graphics character fonts supplied with the package download to the Laserjet Plus for 300-dot-per-inch highresolution output. Like most programs, EasyFlow lets you specify the output port (or a disk file) for its output. More unusually, you can also decide whether you want the output routed through DOS or directly

through the BIOS for higher speed. EasyFlow lives up to its name. It's hard to imagine any easier and more flexible way to produce basic and even complex flowcharts. Whereas you may have previously avoided flowcharts because they were a real pain to create and maintain, you can now add this great documentation tool to your arsenal of graphics presentation tools

MonoGrafx

The basic premise behind Analytx International's MonoGrafx is that users with monochrome video systems, which lack graphics capabilities, should be able to create common business graphics. Although there are a few programs that let owners of monochrome systems specify the information necessary to plot or print charts, the process is usually like flying blind. You can't see what the charts will look like until they're printed, with the usual result being a chart that's not quite what you intended. You then have to modify your input and try again and again.

MonoGrafx works with the monochrome video adapter, whether you use a monochrome or color graphics system. It does so by using the special characters in the high-order portion of the IBM character set to draw lines, boxes, and shaded areas. And it shows you what your charts will look like while you're creating them.



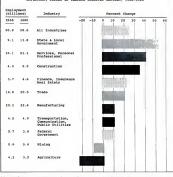
MonoGrafx also lets you expand or increase the size of text if your printer will support those capabilities.

ROLE 893 ON READER

As usual, though, you can't get something for nothing. The available characters include a few shading patterns, two linedrawing styles, a passel of miscellaneous characters, and not much else. Notably absent are curved lines, making circles and other curved objects out of the question. Surprisingly, however, the lack of curves proves much less restrictive than you would imagine. Other than pie charts, most business graphics use straight lines; business forms are almost totally rectilinear, too.

MonoGrafx's interface is first-rate. Obviously derived from Framework II, it has a menu bar at the top of the screen and rolldown subsidiary menus. As with Framework II. MonoGrafx was inspired by the Macintosh. However, this program doesn't support (or particularly need) a mouse. If you want to specify individual characters, you can use function keys to pick 20 of the high-order characters. For some reason, though, you must specify many of the other characters with the clumsy Alt-key sequences. Normally, using MonoGrafx's Fill command, which conveniently displays all of the available characters in a pop-up window and lets you choose the one you want directly, is faster and easier than using keys.

EMPLOYMENT TRENDS IN VARIOUS INDUSTRY SECTORS, 1966-1980



Monografs lets users with monochrome video systems, which lack graphics capabilities, create common business graphics by using the high-order portion of the IBM character set to draw lines, boxes, and shaded areas. Available characters include a few shading patterns, two line drawing styles, a passel of miscellaneous characters, and not much else. Notably absent are curved lines,

MonoGraft is generally fast (as onewould expect from a nongraphic-pacage, written in assembly language to boot). Drawing boxes, shaded areas, and lines is sarightforward, although you may have to do a lot of Column counting. Also, ciding is expectally easy, and MonoGraft can produce reasonably answer to MonoGraft and simple business forms. Ultimately, though, MonoGraft is undone by the primitive drawing tools dictated by its

monochrome character set.

A reasonably full-featured keyboard
macro program named Replay! is included
with the package. Unfortunately, Replay! is
a activated with Ctrl-key combinations
that are used by many popular programs.
Detailed instructions tell you how to
change this, but why choose such key-

strokes in the first place? Using a macro program with a chart package is a good idea, and the manual suggests several creative ways to use the combination to good advantage. Replay! isn't the equal of macro leaders such as Prokey, SmartKey, and SuperKey, but it's more than adequate for the tasks at hand.

The documentation for MonoGrafx is well written, comprehensive, and easy to understand. Both on-disk and printed tutorials help you get up to speed quickly.

MonoGraft is available under two names: MonoGraft and FormWorx. The two programs are essentially the same, the only differences being their names and packaging. The reason for the different packaging is that the programs are aimed at users with different pnecks In time, each

program will be customized for its specific users' needs.

MonoGrafix works with the HP Laserjet via a special driver program called JeWork, which is supplied at no cost. The Laserjet, however, can't print the larger text characters, and you need the HP "Y" carridge (the one with the full IBM character set) for MonoGrafix to work totally correctly.



Monografx's interface is first-rate. Derived from Framework II, it has a menu bar at the top of the screen and roll-down subsidiary

menus. MonoGrafx does absolutely the best it can with what it has, but I'm just not convinced that a nongraphics monochrome environment is the right choice for any chart and form preparation beyond the most casual or occasional needs. Given that a Hercules graphics card lists for less than \$300 and is readily available at a healthy discount, and clone adapters are available for under \$100, there seems to be little reason not to move up to monochrome graphics. This is especially true since doing so gives you a huge base of existing graphics software, including sophisticated business and presentation graphics. at low cost and without the need to scrap an existing mono monitor. There are obviously some good minds behind MonoGrafx. I'd like to see what they could do with real graphics.

OrgPlus

Organization charts can be difficult to create in many general-purpose business graphics packages—you have to draw the boxes, line them up, enter text, and so forth. But they are the raison d'être for Banner Blue Software's OrgPlus, and the



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package lets you make them easily, quickly, and very well. Furthermore, it takes no time to learn, yet it's comprehensive and flexible.

OrgPlus's data entry screens force you to assign levels to each employee according to where he or she stands in the organization. You assign arbitrary numbers to the job functions in the coprorate hierarchy, I being the highest—so the president would be at the first level and the vice present would be at the first level, and the vice pricent would be at the first level and the vice pricent would be at the second level. You navigate through the levels, easily entering names, titles, and comments for each one. You can specify direct or dotted-line re-

porting, staff-level positions, multifine ti-ties, and blocks of text amotations. It's cougally easy to add, delete, and move individual titles and entire branch proups. And chart to another dearn to make large, complex charts manageable. There are some organizational relationships that OrgPlus cannot handle; one is that staff-level positions cannot have anyone report to them. But in general, with 256K bytes or more of SMA, OrgPlus can accommodate up to 350 distinct positions, more than enough data.

To enable you to enhance the visual appeal of your charts, OrgPlus has eight different box styles and seven chart styles. The program displays what the chart styles look like, but only in general terms. There is no on-screen preview of what your specific chart will look like when it's printed or plotted.

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printer and the proper of the printer
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chart is printed, the program sometimes
selects form and changes the box styles to
more control over forts on printers and
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protters and support of proportional forus

on the Laserjets, but for the most part the output looks very good.

If you need to produce organization charts, for only \$69.95, OrgPlus, a non-copy-protected program, is a bargain. It proceeds along its appointed rounds smoothly, quickly, and effortlessly.

...

Sign-Master

Sign-Master is another member of the Decision Resources (now Ashton, Tate) fam. ily of graphics programs. (See reviews of Diagram-Master and Chart-Master elsewhere in this issue.) Sign-Master's speciality is text-oriented charts for presentations, projections, and slides. Although many business and presentation charting programs can produce text-only charts, the results are often dull. With Sign-Master. you can produce nice-looking charts by choosing from seven attractive fonts (including a useful symbol font supplied with several Ashton-Tate programs) in any of 16 sizes and eight colors. In addition, you can center or justify text, convert it to italics, and, using a table mode, you can easily draw boxes around text to differentiate portions of your chart. Text charts may never knock an audience out, but Sign-Master's inspired techniques let them go a long way toward capturing attention.

To use Sign-Master, you define your



OrgPlus's only purpose in life is to make organizational charts—and the package does it well. OrgPlus allows you to specify direct reporting, staff-level positions, multiline titles, and more. To enhance the charts, OrgPlus includes eight box styles and seven chart styles.



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Sign-Master specializes in text-oriented charts for presentations, projections, and slides. To spice up such charts, Sign-Master includes seven fonts in eight sizes. You can also center or justify text and convert it to italics.



Text charts may never knock an audience out. but Sign-Master's inspired techniques let them go a long way toward

chart by choosing options from menus and answering a series of prompts. You can enter, edit, and otherwise manipulate your text easily. Sign-Master, like other Ashton-Tate programs, also lets you preview your chart on the screen, showing you exactly how the hard copy, including the actual typefaces and colors, will look, Since

plotters and printers can take a while to produce paper output, the preview feature can be a real timesaver.

Sign-Master worked without a hitch. and the charts we produced were snappy and attractive. The program worked fine with an AT computer, EGA video, HP Laserjet Plus, and various plotters. Sign-Master supports a long list of plotters and printers, so you shouldn't have any prob-

lem using it with any likely configuration. The program's copy protection is aggravating, but no more so than any other program's. Our only other serious objection is the price. It's definitely on the costly side for a program that produces only one type of chart, especially when so many other business graphics packages throw in text chart capabilities. It does an excellent job, though, and if you create a lot of text charts Sign-Master is definitely worth your consideration.

Glenn Hart is a contributing editor of PC Magazine.



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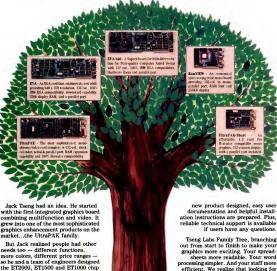
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ou can find lots of affordable software for creating attractive business graphics. But the best chart in the world is of little value if it's being held hostage inside your PC.

Although your options include prinouts and plots of your charts, the highest quality and most professional output is achieved using 35mm color sildes. With 35mm, you can produce high-resolution, crisp, colorful images. According to a recent study done by the 3M Copp, in conjunction with the University of Minesoda, silde shows are perceived as being the most procession of the procession of the color of the procession of the procession of the are perceived as being the most procession of the procession of the procession of the are perceived as being more interesting presenters.

Once you've used your graphics software to create a thoroughly impressive image, you'll want to produce professional-quality output.

That means 35mm slides. You can produce slides either by using film recorders or by taking your data to a service bureau.

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OUALITY OUTPUT

You have two alternatives for translating your images into slides. You can buy a film recorder or screen camera or find a service bureau to create the slides for you.

The advantages of purchasing your own film recorder or screen camera are that you can keep sensitive material in-house. You'll also receive the fastest possible turnaround time. And, since producing each slide from a service bureau can cost from \$10 to \$50, in the long run, if you produce a high volume of slides, you'll save money.

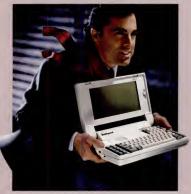
But film recorders do require a significant investment (the low-cost Polaroid Palette sells for \$2,000, while high-end film recorders can go up to \$225,000). The results depend on the resolution of your machine, which will vary from 640 by 700 for the Polaroid Palette Plus to 8,000 lines. for Presentation Technologies' Image-Maker. Results will also depend on your selection of the correct film and the good working order of your film recorder. There's a steep learning curve, unless you invest in an accompanying staff. And, the in-house film recorder leaves you with a roll of film that still requires developing and slides that still need mounting.

If your business requires only a moderate amount of high-quality slides and you have a limited need for custom artwork, you might consider a service bureau. Service bureaus take PC-based data and images sent via modem or on a floppy disk and output the image to a high-resolution film recorder or printing devices. You can expect 4,000-line resolution as the standard from a service bureau. Some service bureaus also provide services that customize and enhance slides based on your specifications. The presentation-quality graphic is on its way back to you within 24-48 hours.

Turn to "Producing Quality Output: Three New Film Recorders" to find all the information you need to understand the technology and features of film recorders and reviews three of the hottest new products. Presentation Technologies' Image-Maker, the Polaroid Palette Plus, and General Parametrics' PhotoMetric 200PC. "Producing Quality Output: The Service Bureau Option" provides you with a roundup of the types of services available.-Robin Raskin

Slide shows are the most professional form of presentation. And those who use slides are perceived as being more interesting

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Three New Film Recorders

For keeping sensitive material inhouse, for the fastest possible turnaround time, and for long-term savings, you'll want your own film recorder. But you'll need a significant initial investment.

investment.

Here we review
three of the
latest products.

If you need to produce slides from the graphics you've created using soft-water, you might consider a film records. Using your own film records will keep your own film records will keep your graphics away from prying yoes, give, you the fastest turnauoud time, and cease large numbers of presentations economically. However, you'll spend a minimum of \$2,000 and could well require the services of a trained technical.

the services of a trained technician.

Once you'd odecide to go with a film recorder, you'll need to understand how
these products work and the similarities
and differences between them in order to
make the most intelligent decision for your
application.

Film recorders and screen cameras are specialized combinations of electronic and photographic technologies that convert the images you've created with your computer graphics program into slides (and other photographic media) that you can use for presentations and publications.

Because they are not limited to the PC's display standards, film recorders can create images with higher resolution and a greater variety of colors than a PC can ordinarily display for a screen camera to capture. Film recorder images are usually sharper, more detailed, and more colorful.

snaper, more detailed, and more colores have been introduced recently. These new recorders provide higher-quality images at more affordable prices than ever. We examine three of the most interesting new film recorders the Polaroid Palette Plus, an improvement on the old standard. General Parametrics Corp.'s PhotoMetric 200PC, which offers a new means of capturing images that follow a familiar stan-

dard; and Presentation Technologies' ImageMaker, a radical film recording system that does sawy with the dol bagaboe called the picture tube. The consecution of the picture tube consecution of the consecution of the one of the consecution of the consecution of the one of the consecution of the consecution of the secondary. "PC Magazine, Volume S Numtor 9. For the highlights of these products, see sidebar "More Alternatives" and the features table.

TECHNICAL TRIO Though different inmany ways, all three of these new film recorders share similar technologies. Each is an imaging device that outputs to photographic film. Like a plotter or graphics printer flour unlike a monitor or screen or screen from the properties of the prope

Generally, all film recorders have three essential parts: the interface, the imaging device, and the recording device.

The interface is the combination of hardwar and software that sends the control signals to the film recorder. Most film recorder. Most film recorders are built around the RS-232 hardware standard and plug into a convenious serial port. In some cases, film recorders also use the PC's video output to help generate their images. The software portion of the interface either allows you to directly control the instructions sent to the film recorder, or it acts as a driver that allows another program to control the report of the report

Because no standards have yet emerged for film recorders, each one creates its own control codes. Each film recorder, therefore, requires a special software driver—which your graphics program may or may not have. As a result, software compatibility is a major concern when considering a film recorder.

SHARPER IMAGE Most film recorders (with the exception of Presentation Technologies' ImageMaker) use a conventional cathode ray tube (CRT)—in television parlance, a picture tube—as their imaging device. The size and quality of the CRT display plays a large part in determining the final quality of the images produced by the film recorder.

Your primary concern in the imaging system is its resolution: the higher the resolution, the sharper the image. Resolution is usually measured in the number of lines that make up the entire screen in a ratter display on the CRT and, thence, on the fillim. Normal television pictures have a vertical resolution of about 480 lines for the CoA display to 350 lines for the CoA display to 350 lines for the Monochrome Display Adapter and EGA.

The resolution of film recorders ranges from the pathetic PC standard up to a glorious 10,000 lines. Note, however, that 35mm film also imposes limitations on the resolution of photographic images in the range of 2,000 lines. (The greater resolution available from more-expensive film recorders is useful for larger film formats.)

Resolution figures are sometimes also given in terms of "addressability." Addressability relates to how precisely the recorder can position the electron beam in the CRT as it makes the image. It does not directly correspond to resolution because the beam has a definite size and a smaller beam can draw sharner images.

This beam width is narely described muerically. While a smaller beam width can resolve a finer image, a wider beam is instrumental in helping to remove some of the jaggedness from raster images. For optimum operation and the best appearance of the final image, the beam width should be matched with the addressability of the system.

systems were grown from recorder (including the novel Imageshader) uses a monochromatic image source, that is, white light. To put color on fillin, most use a color wheel through which the film is exposed to separate (and usually different) images in each of the primary colors of light (red, green, and blue). The film sums up the total exposure of all three colors to create a complete rainbow of hues.

In theory, film recorders using this system are capable of generating an infinite variety of colors. Reality and programming considerations often limit the num-

FILM RECORDERS AND SCREEN CAMERAS

Although often used interchangeably, the terms "screen camera" and "film recorder" describe two very different devices. The source of confusion is their computer-generated images on film. Otherwise, the two differ in both function and rbhilescopts.

The screen camera is designed to render the image that is displayed on the monitor of your PC as closely as possible on film. The film recorder is a computer-controlled output device that generates images that are independent of what you see on the screen. While the screen areast pulpicates or captures an exact replica of the video display screen, the film recorder is more concerned with quality. The screen camera either sands the

image directly off the screen of a PC or substitutes its own, higher-quality monitor. As a result, the film image has all the limitations of the standard PC color dislimitations of the standard PC color disstandards). Although these images will improve as more screen cameras adapt to the newer, higher-resolution IBM Enhanced Graphics Adapter, they still remain limited by the design trade-offs main limited by the design trade-offs IBM has made (and continues to make)

in selecting its monitor standards.

The film recorder does not suffer from
the limitations of the display system. It
traces to film entirely new images that are
produced by software running on the PC.
For the most part, only this software must
conform to the PC standard.

With most film recorders, the PC manipulates only the data that will be used in constructing the final image. This data is then sent to the recorder just like any other data, as a series of instructions that tell the recorder how to draw the final image on the film

The PC must know the right commands to send to the film recorder, and it learns these commands from software, such as your graphics package. Therefore, to be compatible with a particular film recorder, a software package must have a driver for that film recorder corder. The software selection for a new or unpopular film recorder can be outle limit.

As a result, your choice of film recorder depends on the software you want to use. A screen camera is almost universally compatible. It will put any image on film that can be displayed on a monitor.—Winn L. Rosch

ber of available hues to a more modest number, six and up.

RASTER MASTER Most film recorders that use CKTs use either raster or vector displays, but her majority use the raster method. A raster image is divided into scan lines, each line consisting of a series of individual dots cut from a thin section of the mali image. The electron beam in the formal image. The electron beam in the down the face of the tube in a zigzang potent. The intensity of the beam at any continuation of the continuation of th

The pattern of dots making up the picture to be displayed is usually memorymapped—held in a block of memory ar-

ranged in two axes that correspond to the height and width of the picture, and the information for each dot is read sequentially causely corresponds to the dot pattern on the screen. Ullimate on-screen resolution is limited, therefore, not only by the quality of the display system but also by the amount of memory devoted to storing the disblay information.

When the amount of memory is small compared to the capabilities of the display system, it is likely that unsightly jaggedness will result. Although the CRT is capable of displaying smooth lines, the dots will be held in the larger chunks that the memory can handle. The electron beam is forced to display the same jagged, chunky

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MORE ALTERNATIVES

n addition to the three devices exam-Magazine last year reviewed five other screen cameras and film recorders rangine in price from \$875 to \$11,795

One of them was the original Polaroid Palette, physically identical to the Palette Plus but only CGA compatible and packaged with accessories not quite as fancy. It's still available and priced at \$1,995. Here's a quick look at the other alter-

natives:

DATACAM 35

Photographic Sciences Corp.'s Datacam 35 is a genuine minimalist deviceessentially a 35mm camera and special lens attached to a plastic hood that mates with an IBM monitor so you can snap screenshots. Although its on-film quality is low-an exact match for the IRM display standard-its usefulness is high. It's a point-and-shoot system with which you can take a picture of any screen in seconds

COLOR DIGITAL IMAGER IV

Bell & Howell's Color Digital Imager IV (CDI-IV) is based on a repackaged (more massive in look but identical in function) Polaroid Palette, and becomes an integrated hardware and software graphics system when combined with Bell & Howell's Graphics Express software (which is based on Xenographics' Mirage). Refinements over the Palette include support for a super-high-resolution preview monitor and the ability to understand HPGL and, thus, use plotter software.

image on-screen as is held in memory. Vector displays work much like drafts-

men do. The on-screen image is drawn with strokes of the electron beam. The beam starts at one position on the screen and proceeds directly to another, tracing a straight line, with no jaggedness, between its starting and ending points.

The vector image is stored in memory as a series of drawing commands; the final

LASERGRAPHICS MPS-2000

Lasergraphics' MPS-2000 Management presentation system adds a sophisticated image processor-a separate, PC-size box-to its Polaroid Palette foundation. The image processor interprets vector commands into the Palette's raster formot and understands both its own command language and HPGL (which makes the system compatible with most plotter software). Its image addressability of 2,048 by 1,366 helps eliminate jagged images, but its sharpness is limited to that of the Palette itself (about 1, 100 lines).

MATRIX MVP.PC AND MATRIX PCR

The Matrix MVP-PC/Matrix PCR system is the ne plus ultra of today's PCbased film recording systems, Its large, flat-faced, 7-inch CRT gives resolution beyond the capabilities of 35mm (4,000 lines) and really requires 4- by 5-inch film to be appreciated. The camera section is a free-standing unit that requires the expansion card-mounted MVP-PC coprocessor for control. As with the best of anything, it's expensive. -Winn L. Rosch



FACT FILE

Datacam 35 Photographic Sciences Corp. 770 Basket Rd. Webster, NY 14580 (716) 265-1600 List Price: \$875 Reontres: IBM Color Display, IBM Enhanced Color Display, or monitor with 12-13-inch senen size CIRCLE \$30 ON BEADER SERVICE CARE

Color Digital Imager IV Bell & Howell Co. 411 Amapola Ave Torrance, CA 90501 (213) 320-5700

List Price: \$ 5,500; monitors from \$600 to Requires: 320K RAM for Graphics Ex-

press, serial port. Math coprocessor recommended CIÁCLE **637** ON READER SERVICE CAR

Lasergraphics MPS-2000 Lasergraphics Inc 1761 Cowan Ave. Irvine CA 92714 (714) 660-9497

List Price: \$6,995 with 35mm camera and pack film camera backs, one language (Lasergraphics or HPGL), and 256K RAM. Requires: Serial port. CIPCLE 638 ON READER SERVI

Matrix MVP-PC Matrix PCR Matrix Instr I Ramland Rd. Orangeburg, NY 10962 (914) 365-0190

List Price: Matrix PCR and MVP-PC together, \$13,795; MVP-PC alone, \$2,495; PCR alone, \$11.795.

Requires: 512K RAM CIRCLE 635 ON READER SERVICE CARD

image is not constructed until it actually | extremely complicated process.) appears on the face of the tube.

Vector images can often appear noticeably smoother than raster pictures. Many software packages create their patterns using vectors and then convert their results to raster patterns for display on the computer monitor. (Although vector images can be converted into raster images without too much difficulty, going the other way is an

Despite their technical differences, another common thread unites the current crop of film recorders. The level of professionalism and finish among them tends to be higher than almost anywhere else in personal computing. All three of these units rate as well-integrated systems with thorough, professionally written and printed documentation





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Here's a closer look at each member of this elite trio

ImageMaker

One of the chief limitations on the final quality of an image made by a film recorder is the resolution of its CRT system, since that image is usually nothing more than a picture of the CRT face. Unfortunately, CRT display systems with thousands of lines of resolution are expensive, delicate, and cantankerous.

Presentation Technologies believes that the CRT is the major impediment between you and higher-quality slides. Consequently, the ImageMaker uses no CRT. Instead it substitutes a mechanically complex optical system and a font wheel.

Like a phototypesetter, the Image-Maker focuses a light beam through transparent, picture-perfect characters on a black disk. The disk rotates the desired character into the path of the light beam. A special optical system then focuses the illuminated character on the film, exposing it and making the image.

The character images are arrayed in several tracks around a disk that is 6 inches in diameter and is held in a plastic carrier.



Instead of a CRT, Presentation Technologies substitutes a mechanically complex optical system and a font wheel into the ImageMaker, which functions in much like a phototypesetter.

The whole assembly is called a font cartridge, and it roughly corresponds to the daisy wheel of a fully formed character printer. Several sizes or styles of character are arranged in parallel tracks. You can easily interchange font cartridges—you simply pull one out and slide another in.

To make graphic images, the Image-Maker uses drawing styli, which are actually dots on the black character disk. The optical mechanism continually moves while imaging the stylus, creating vectorlike strokes on the film, much as a plotter would. Presentation Technologies will also put often-used graphics symbols—for instance, company logos—on custommade font cartridges.

In the ImageMaker, the light source is a 12-voit quartz-halogen projector bulb in a condensing optical system. To achieve different colors, filters with varying lengths of exposure are slipped into the light path. The current color selection allows 6 background and 16 foreground colors.

The image is focused on film by a lens assembly held by a mechanically complex arm that moves in two planes and is controlled by the ImageMaker. The placement of the lens determines exactly where on the film each character will appear. According to Presentation Technologies, the mechanism is accurate to .0005 inch (one-half of a thousandh of an inch).

Making a text-only slide typically requires 2 to 4 minutes. A complex graphics slide may take as long as 10 minutes.

At the front of the ImageMaker is a chamber containing a 35-mm camera that is concealed by a plastic door. The camera is constructed around the chassis of a Pentax do-everything reflex camera that lacks

Film Recorders: Summary of Features

Product/ Manufacturer	List price	Imaging mathed	Resolution (pixels)	Colors	Film backs avellable	Makes screen- shels	Accessories lockeded	Control software copy protected
ImageMaker Presentation Technologies	\$4,995	Font cartridge	8,000 (equivalent)	16 foreground 6 background	35mm	0	None	0
PhotoMetric 200PC General Parametrics Corp.	\$5,995	CRT	2,000 × 2,000	1,000	35mm; 3¼- × 4¼-inch*	0	None	•
Polaroid Palette Plus Polaroid Corp.	\$2,999	CRT	640 × 700	72	35mm; 314- × 414-inch; 3- × 4-inch Autofilm*	•	Power processor,† Illuminated silde mounter	0
Color Digital Imager IV ^s Bell & Howell Co.	\$5,500	Font cartridge, CRT	2,000 × 2,000 (equivalent)	4,096	35mm	•	Auto processor [†]	0
Datacam 35 ¹⁶ Photographic Sciences Corp.	\$875	Photographic	CRT smited	Unlimited	35mm; Polaroid Instant Print	•	None	N/A
Lasergraphics MPS-2000 [‡] Lasergraphics Inc.	\$6,995	CRT	2,446 × 1,366	1 million	35mm	0	Auto processor ¹	0
Matrix MVP-PC/Matrix PCR [‡] Matrix Instruments Inc.	\$13,795 (\$2,495 MVP-PC only)	CRT	2,000 × 2,000 or 4,000 × 4,000	256	35mm	0	None	0

—Indicates Editor's Choice. ●—Yes O—No N/A—Not applicable; doesn't use software.

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ImageMaker Presentation Technologies Inc 743 N. Pastoria Ave.

Sunnyvale, CA 94086 (408) 749-1959 List Price: \$4,995; ImageMate software,

\$295; font cartridges, \$395.

Requirest Scrial port.

In Short: A novel film recorder that does away with the CRT by using a phototypesetter-like font cartridge to make high-resolution (near 8,000-line) text slides and some chart styles on 35mm film.

OFFICE 638 ON READER SERVICE CARD

prism optics and a reflex mirror (although the mechanical assembly that operates the rairror is still present). The only remaining functional parts of the camera are the shutter and film transport path. The camera has a built-in motor drive but requires manual rewinding. Once the film is loaded, the camera needs no attention until you've shot the roll of film.

The whole ImageMaker assembly fits into a beige plastic case about the size of a breadbox. It connects to its host PC

through a standard serial port. The system can be controlled by Presentation Technologies' own ImageMate software, which generates both text slides and simple charts. Other software compatible with the ImageMaker includes PC-Slide by Management Graphics and, reviewed elsewhere in this issue, Harvard Presentation Graphics by Software Publishing and SlideWrite Plus by Advanced Graphics Software.

EXCELLENT TEXT SLIDES The ImageMaker-ImageMate combination is to other film recorders as a fully formed character printer is to a dot matrix machine. It

is superlative at making text slides. The recorder's graphics mode also provides abilities resembling those of a plotter. It therefore also does a reasonably good job of drawing colorful bar and pie charts in its graphics mode. But it lacks the versatility of a wide variety of instantly changeable

type fonts and a diverse color spectrum. The resolution of the ImageMaker is rated at the equivalent of 8,000 lines (equivalent because the ImageMaker has no lines). In fact, the ImageMaker is probably sharper than the film that it uses. On text slides, its quality on 35mm film looks as good as that achieved by CRT-based (film recorders ostine 510,000 and up.

If you primarily use text slides, you might be able to get by with just the Image-Maker. However, you'll more likely find it to be an excellent adjunct to a more conventional film recorder. Use the Image-Maker, therefore, when you want your text slides to make the best possible im-



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Trunvision is a registered trademark of AT&T IBM is a registered trademark of International Gusiness Machines Corp. Supposeted retail prices: TARQA 16 (\$2995), TARQA 24 (\$3995), TARQA 32 (\$4995), TIPS (\$1250). pression, and use the other film recorder for elaborate charts and other graphic images.

. .

Polaroid Palette Plus

The most popular of all film recorders undoubtedly is the Polaroid Palette. But as good as it is-good enough, indeed, to be the industry standard-the Palette has its shortcomings. The foremost deficiency is its resolution

Polaroid Corp. designed the original Palette around the IBM Color/Graphics Adapter. When interfaced to the PC, it could not aspire to higher resolution than that adapter allows-even though the Palette itself was capable of resolving approximately 1,000 lines. Although the Palette used fancy tricks to add extra colors (from a choice of 72) and to sneak resolution up to 640 by 400 lines, it could never overcome the limit imposed by its composite



Because the Palette Plus is compatible with the software drivers used for the original Polaroid Palette, it already has a very large software hore

video interface on the CGA Introduced at Comdex in the fall of 1986, the Polaroid Palette Plus nearly doubles the effective vertical resolution of the original Palette by adapting itself to the signals of IBM's Enhanced Graphics Adapter. Using software with a driver for the new Palette Plus, image resolution can be as high as 640 by 700 in full color. Even without the use of special software drivers. the new Palette Plus can put any EGA image on film-and can enhance its colors along the way.

Outwardly, little seems to have changed with the new Palette Plus. It still fits in the same shoebox-sized case. The display and film sections, too, are little altered. Hidden deep inside the beige-andgray metal box is a 3-inch CRT. In front of the tube is a color wheel that alternately spins red, green, and blue filters.

The Palette Plus allows you to use three film formats and three different camera backs-35mm, 31/4- by 41/4-inch pack film, and 4- by 3-inch AutoFilm (integral developing print film like that used in SX-



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A SHARPER IMAGE

Your primary concern when purchasing an imaging system is its resolution; the higher the resolution the sharper the image. Of all the film recorders reviewed in this issue, the ImageMaker from Presentation Technologies provides the highest resolution. You can see what 8,000-line resolution looks like in the pie chart labeled A. The Palette Plus, which created slide B, outputs slides with the lowest resolution. The new Palette Plus uses software with a driver to adapt itself to the signals of IBM's Enhanced Graphics Adapter, resulting in image resolution as high as 640 by 700. The vector-based PhotoMetric 200PC, which created slide C, provides 2,000-by 2,000line resolution and claims a color range of 1,000 different hues.



70- and Spectra-style cameras). The first two of these are included as standard equipment. In addition to ordinary and instant 35mm slides (color and black-andwhite, high and normal contrast), the Palette Plus also supports color and blackand-white instant print and not-yetcommercially-available Colorgraph overhead projection instant pack film.

The 35mm camera back, which you cannot remove and use as a normal camera, has motorized wind and rewind. The pack-film back is a plastic creation that fits only the Palette

The Palette Plus attaches to your computer with a double connection. It receives data and instructions for changing colors through a serial connection and video information through an EGA connection. That is, you plug the Palette Plus into your EGA, then plug your monitor into the Palette Plus. In this way, the video signal bound for your EGA display loops through the Palette Plus.

Because the Palette Plus actively manipulates the signal on its way to your monitor (letting you preview the image much as it will be photographed), the film recorder must be turned on at all times when you want to see an image on the monitor, regardless of whether you plan on taking pictures.

Unlike the original Palette, the Palette Plus requires no setup adjustments. In lieu of the video threshold control used by the original Palette, the Plus has a zoom control that allows you to adjust image size by about 4 percent. In actual operation, little is changed with the upgrade to the Palette

TWO POLAROID PROGRAMS As in the older model, Polaroid supplies two programs to let you capture screens that are

generated by other software.

One of the programs, OneStep, is a memory-resident screen-grabbing program that also allows you to directly print the screen to the Palette Plus. At the same time, it also allows you to alter image colors, and, if you want, save the augmented image to disk. OneStep works one image at a time and will not batch process multiple screen files. Once it is loaded into memory, you call up OneStep by pressing a two-key combination (Ctrl and one other key of your choice). From then on, the program is menu driven and completely straightforward.

Polaroid's Palette program allows you to print to film images that have previously been saved by OneStep. It has batch processing capabilities, so you can program it to print enough images to fill a whole roll of film. Like OneStep, Palette also allows you the freedom to alter the colors of the

image that you're going to print.

Although the Palette Plus can record a screen image in less than 15 seconds, the process can take considerably longer if the images have been made by programs with special Palette drivers.

The Palette Plus comes as a complete system, including the basic film recorder. connecting cables, two camera backs, a power processor for Polapan and Polachrome instant 35mm films, and an illuminated slide mounter

Because the Palette Plus is compatible with the software drivers used for the original Palette, it already has a large software base. With the Polaroid-supplied software, it can duplicate nearly any screen image on film (functioning as a screen camera), making it almost universally compatible.

. . PhotoMetric 200PC

The PhotoMetric 200PC, from General Parametrics Corp., bears a superficial resemblance to the Polaroid Palette, and yet it is distinctively different.

Inside, the PhotoMetric uses a CRT that measures about 3 inches diagonally, including its drive electronics and a color wheel, much as does the Palette.

Standard equipment includes a 35mm camera back that attaches to the front panel of the PhotoMetric using a mounting scheme identical to the Palette. The camera back itself, a remote-controllable, black, motorized auto-wind and rewind



Polaroid Palette Plus Polaroid Corp. Electronic Imaging Dept. 575 Technology Sq. Cambridge, MA 02139

(800) 225-1618 (800) 343-5000 (after March 1)

List Price: \$2,999 Requires: 16K RAM additional background

memory, EGA or CGA board, serial port. In Short: A device that makes film images. (35mm, 31/e- by 41/e-inch or 3- by 4-inch AutoFilm) of either video displays or software graphics in 72 colors with resolution of up to

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EDITOR'S CHOICE

• Polaroid Palette Plus

Each of these film recording systems has its own particular strengths. The ImageMaker will make the sharpest text charts. The PhotoMeric 200PC has the highest full graphics resolution and the most colors. The Potaroid Palette Plus is the most compatible and, with its screen grabbing abilities, the most universal.

Unless you have specialized graphics needs, compatibility will probably be your most important purchasing criterion. The Polaroid Palette Plus rates as the most compatible, useful, affordable, and versatile—although it also gives the lowest on-film resolution of the products examined here. It would be our choice unless we needed the particular high-resolution abilities of one of the other systems.

mechanism that cannot be used as a functional camera, is also identical to that used by the Palette. A 31/4- by 41/4-inch Polaroid pack-film back is optional.

Conceptually and functionally, however, the PhotoMetric is entirely different. Moreover, the PhotoMetric promises a quantum improvement in quality.

While the Palette is basically a rasterbased. It receives vector instructions from the software driver and converts that information to a raster image that is then photographed.

gaspace.

The PhotoMetric's resolution makes the Poloroid Palette Plus look amateurish in comparison. Not only is the PhotoMetric's CRT markedly sharper than that of the Palette, its beam width has been reduced by a factor of 2.2. Because of these and software improvements, the PhotoMetric claims a resolution of 2,000 below. With a color range of 1,000 hase saheived by mixing ten different levels of each of the three primary colors of colors.



The PhotoMetric receives vector instructions from the software driver and converts them into a raster image. The final photograph has a resolution of 2,000 lines.

The system requires a special adapter card: a full-length expansion eard, XTheight, that uses the XT-style 8-bit databus. You also attach this card to your system's display adapter using an unusual three-ended cable. One end plugs into a 25-pin connector on the General Parametrics adapter card. Another 25-pin connector attaches to the PhotoMetric. The third cable end terminates with a DB-9 connecfor that plugs into your display adapter. Your monitor then plugs into a 9-pin jack on the General Parametries card.

The only additional step in hardware installation is setting a single jumper on the General Parametries card to match the type of display adapter used in your particular system. In case of equipment conflicts.



PhotoMetric 200PC General Parametrics Corp. 1250 Ninth St. Berkeley, CA 94710 (415) 524-3950

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you can set the input/output (I/O) port address of the General Parametrics adapter to any one of seven different values using three immors.

Because the PhotoMetric is essentially

vector based, it is choosy about the images it makes and how it makes them. It cannot copy ordinary screens to disk.

As with previous General Parametries products (which include a video presentation system, improved monior displays, and a hard copy system), the PhotoMetric operates from images that have been stored in a special Video Show format, which corresponds to NAPLE'S (North American Persentation Level Protocol Syntax, a Video Tex graphics standard). Compatible programs currently number about two dozen, including General Parametries' own

and-chart slide maker.

The PhotoMetric control program, which operates the film recorder, is quite easy to use since it includes both menus and prompts. It allows individual sildes to be exposed as well as multiple copies of sildes or sequences. Your normal monitor can be used to preview the images to be recorded to the program of th

As with most vector-based systems, exposure of extremely complex images can be quite time consuming. Moreover, because of limitations in the control software, intricate images may require multiple exposures of overlay files that stack detail upon detail in the finished slide. Images of average complexity should require several minutes of exposure. Although the quality of the PhotoMet-

ric 200PC is commendable, a few of its design details are not. For instance, its control program is copy protected—despite the fact that the software requires \$5,000 of General Parametrics hardware to be at all useful. That's stupid. On the other hand, the image quality produced by the ProtechMertie is end use that suspense, and the tiny size of the system makes it seem even more amazing.

Winn L. Rosch is a contributing editor of PC Magazine.



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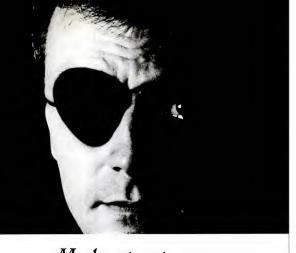
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If you have moderate needs for slide shows, you'll get high-quality output from a service bureau. But because the phenomenon of computer graphics service bureaus is still emerging, you'll find that each bureau has a unique charisma and some distinguishing characteristics. Before you sign on, you should chart your own needs versus their offerings.

own needs versus their offerings. Some of the service bureaus, for example, offer their own name-brand PC-based graphics package as their low-end entry in a spectrum of computerized and noncomputerized photo services. Other bureaus are generic PC-based microcomputer graphics production houses and handle a variety of different software packages and output devices. Some services don't require PC-based graphics software at all-instead you can send them data, from which they will create graphics, via modem. And all are limited in the number of graphics packages they support. So, if you plan on purchasing a package with the hopes of using the services of a graphics bureau, be sure you can locate the bureau

that supports your product before you buy.

To guide you through your choices, the following is a discussion of the things to watch out for and a sampling of some of the offerines available nationwide.

DEDICATED VS. INDEPENDENT
The most well-entrenched services are
evolutions of the high-end graphics workstation market. High-end workstation users ship their graphics to service bureaus
for high-quality output. Some suppliers of
standalone graphics workstations, realizing the untapped market for low-cost com-

puter graphics, have broadened their basic offerings to include PC graphics software that can use the same link to high-resolution output facilities.

These services are software specific. Since you must use their package, you may wind up with a graphics package that is less than ideal for your situation. On the other hand, you are buying into an established network of graphics expertise with a charted course toward upward mobility. Typically these networks supply some customs oftware designed to maximize the attractiveness of your graphic.

Third-party slide bureau companies are a more recent phenomenon. These may or may not be offshoots of larger, full-service photo bureaus. But they can work with data transmitted from a number of PC packages. While they can accommodate a greater number of packages, they offer fewer enhancements.

FINISHING TOUCHES Bureaus differ in the degree to which they accommodate requests for custom work. Some are "what you send is what you get" operations, simply turning around your graphic information into a slide. Others provide a spectrum of customization services. Some will archive your company's artwork. while others will place a company logo on the slide. Still others can create special effects such as zoom, drop shadows, star patterns, or special color schemes, and can insert a symbol or a freehand drawing. Others will help you concentrate on your presentation, offering pin registered slides for accuracy in creating overlays, build, and multiprojector sequences. Some service bureaus even provide the services of graphic artists to help you create a presen-

TRANSMISSION METHOD All of the companies listed take either modem or disk transmission. Some allow you to specify enhancements on their on-line work order. Others require a phone call or written note.

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Pro3D/PC and Pro3D/Mac are distributed to the trade by the Ashton-Tate Publishing Group. 3D Clip Object Disks - Desktop Publishing, Transportation, Anatomy - \$49.95 each. See your dealer for more information.

CIRCLE 307 ON READER SERVICE CARD

PC MAGAZINE . MARCHIO, 1987

PRODUCING QUALITY OUTPUT

output, but it does influence turnaround time

WHAT YOU SEE You may wish to preview the graphic image on your screen. Some services can display a full preview of your image. Others show text, but not the chosen fonts on your preview screen. The 3M Corp. offers a unique text-based service that eliminates the need for a PC graphics package, but it offers no preview capability.

RESOLUTION The computer image you view on your display screen has limited resolution; an EGA card gives 640- by 356-line resolution. But the film recorders used by service bureaus produce anywhere from 2.000- to 8.000-line resolution. The lower resolution is typically less expensive because it requires less image processing time. The standard is 4,000-line resolution which is approximately 36 times higher than the EGA's display screen resolution.

OUALITY SERVICE Regardless of quality or gee-whiz effects, a slide that isn't ready on time, or gets bent in the mail, won't impress any audience. Therefore, before committing yourself to a service, do a trial run. Slides should be delivered on time, carefully mounted and well protected in slide holders.

Don't merely hold a slide up to the light to check on its quality. Project it on the big screen and scrutinize. Check carefully for mistakes, such as lopped-off titles and mountings that cut into the lettering. Are the diagonal lines smooth or jagged; are the pies rounded; are the fonts legible; is the color palette attractive with vivid, deen, easy-to-read colors?

As you practice creating slides, you'll learn to create better slides by practicing the placement of information on the slide and experimenting with the use of color. fonts, and size. But while you are perfecting these talents, you'll want a service that makes the most out of your worst-case learning experiences.

A SERVICE BUREAU TOUR All computer graphics service bureaus give you the opportunity to use first-class equipment, but the rules and regulations vary. Here's a whirlwind tour of what's available



Art Machine sells. installs. and trains you to use customized graphics systems that produce

intricate



Art Machine

Art Machine is geared toward a demanding clientele that requires sophisticated artwork a step above the mainstream business graphics package. The bureau specializes in selling, installing, and training you to use customized graphics systems



FACT FILE

Art Machine Inc. 611 Broadway # 613 New York, NY 10012

(212) 505-6400 Input: West End Film's Chartwork, Artwork, Brushwork, Videowork, Pagework; Xenographics' Mirage, Autumn, Ego, VR;

all Digital Arts software; AT&T's Truevision: Artronics' Paint, Automatic Data Illi trotor Louis's 1.2.3 List Price: \$10 for slide reproduction, \$30

for creation of graphic.

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that produce such intricate graphics as 3-D, texture mapping, and reflections, as well as free-form drawing.

Art Machine will accept a disk (not telephone transmission) of data generated by any of the packages it selfs and will output the information to either its Matrix QCR or Matrix PCR film recorder. Services similar to Art Machine's are available in most major U.S. cities, according to an Art Machine spokesperson.

• • Autographix

Autographis develops, manufactures, and markets graphics systems, software, and imaging services. Autographis's Slude Expert (roviewed in this issue) and Autographis 35 Presention Graphics 56/fware are PC based and are upwardly compatible with sophisticated Autographis worksations. Images created with these packages can be transmitted to and enhanced at any of four regional Autographis. Imaging Centers.

You transmit the image to the Imaging Center via modern using a communications component built directly into the Autographix software. Next-day service is standard with Autographix. Imaging centers output to 4,000-line Celco film recorders, Autographix laser printers, and Autographix lost thermal printers. Output includes slides, prints, stats, overhead, and printed documentation.

PC users can preview the image onscreen if they choose, but all text and data is translated to high-quality fonts once it arrives at the Autographix Imaging Centers. Autographix offers the convenience of credit card billing.



Price: \$10 plus delivery (overnight); \$20

plus delivery (same day); \$30 plus delivery (same day in five hours). CRCLE 603 ON READER SERVICE CARD AZTEK

Aztek offers a complete computer art service originally for Hewlett-Packard main-

frames and more recently available to PCs. The company's high-end PC product, called *The Studio System*, sells for \$46,000. Its entry-level product, *PCchart* (reviewed in this issue), allows you to gen-

PC TOOLS

"...a worthwhile addition to any software library." PC Magazine

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PC Magazine names PC Tools their Editor's Choice and adds, "There's no reason to look beyond PC Tools..."

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they end up making work harder.

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CIRCLE 244 OM

erate simple charts and graphs. PCchart contains a telecommunications component that links to an Art Center location. Independently operated Art Centers are located throughout the country.

Because PCchart outputs to a number of high-end film recorders, you have a greater choice of bureaus. Many of the Art Centers supply the software at minimal cost in order to promote their slide business, both computer and otherwise.

For example, at Allen Photo (Arlington, Virginia), an Art Center location for PCchart, you send chart information via modem or disk to the bureau. A PC receives the image and sends it to an HP 1000 that then displays your graphic on its 1,000-line monitor. At this point, the company will make any requested enhance-



ments for an extra charge. The HP system can even create animation for multi-image shows. Output is sent to a Lasergraphics unit (to speed up recording), then to a Matrix QCR, and is finally photographed with a pin registered camera. This Center is a division of a larger photo lab.



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Brilliant Images' Computer Picture Service is unique because the service supports ten popular graphics packages. Brilliant Images accepts data sent on a disk or via modern using any standard telecommunications package, and, in fact, is the only service that can accommodate MCI Mail. This makes it a viable link for those outside of the New York area. In addition, you can ship data around the clock, and slides are



Brilliant Images accepts data sent via modem using a standard telecommunications package and is the only service that accommodates

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delivered within 24 hours. Based entirely on personal computer technology, Brilliant Images uses a num-





writer, Freelance, Freelance Plus, Microsi Chart; Xenographics' Mirage, Auto Execucom Systems Corp.'s Impressionist, Bell & Howell's Graphics Express; Manag ment Graphics (Canada)'s PC-Stide: Software Publishing Corp.'s Harvard Presentation Graphics. Accepts normal

munications packages and also takes MCI Mail files. Price: \$8 (48 hours); \$10 (24 hours); \$25 (8

hours). Price of enhancements varies CIRCLE 601 ON READER SERVICE CARD



Data Color Graphics 9645 Webb Chapel Rd. Dollas TX 75220 (214) 350-9443

Input: Lotus's Freelance, and Freelance Plus, Graphwriter, Software Publishing Corp.'s Harvard Presentation Graphics; ement Graphics (Canada)'s PC-Stide Cricket Software's Cricket Graph; West End Film's Artwork; Enertronics Research's Energraphics; Bell & Howell's Graphics Express, Microsoft Chart, Aztek's PCchart,

FILE

Xenographics' Mirage Price: \$7.50 for 2,000-line resolution, \$15 for 4,000-line resolution. CIRCLE 630 ON READER SERVICE CARD

slides, overheads, and 8 by 10 transparencies or printed handouts.

In addition to reprographic services, Brilliant Images offers a full range of graphics services, including custom effects, logos, consultation, and training. A staff of artists offers custom graphics service to enhance PC-generated images. Brilliant Images is the only service we came across whose sole business involves microcomputer graphics production from PC software. Expect more of these in the future.

Data Color Graphics

Data Color Graphics is a full-service film lab that is expanding into the field of PCbased slide production. Data Color views computer graphics slide production as a logical extension of its work. It has acquired a number of PC packages and is expanding its support for additional PCbased graphics packages based on user requests and on the company's ability to tweak and tune the connection between a package and the film recorder.

Data Color Graphics uses a Matrix QCR and accepts input from any PC business software package that supports the Matrix OCR as an output device. Unlike some of the other "4,000-line" bureaus, Data Color normally provides 2,000-lineresolution slides. The lower resolution can be processed more quickly and is less ex-



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Data Color Graphics provides 2,000-lineresolution slides, less expensive yet virtually indistinguishable from

4.000-line.

pensive, yet is virtually indistinguishable from 4.000-line.

Currently, Data Color does most of its work with Roppy disks instead of phone lines. It believes that users think phone transmissions introduce too many errors. The company offers a walk-in or mail-in business. Currently there is little support for customization or enhancements, but the company says it will accommodate other arrangements as the need arises.

• • Genigraphics

Genigraphics has long been the leader in VAX-based graphic imaging, Graftime for the PC (reviewed in this issue) provides a low-cost link to the extensive Genigraphics imaging network. Graftime uses preformatted templates for creating graphs and charts and provides a form for you to fill out, in which you specify enhancements, quantities, and output desired. A Graftime utility converts the file to a metatile of information to be transprinted via



modem. Any standard communications package transmits the file to any of 25 Genigraphics Service Centers. The Virtual Device Metafile provides upward compatibility with Genigraphics 100 series

workstations and its PS and Masterpiece Series film recorders. Turnaround is typically 24 hours using Federal Express. The Genigraphics film recorders have resolutions from 2,000 to 8,000 lines.



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MAGICorp

MAGICorp offers a software-independent process for the production of slides, trans-

parencies, and prints. The company holds the patent on the transmission of graphic information over the telephone for the production of ultra-high resolution photographic images, and its software is free to



MACIC op De Leccine Byd. Elmsford, NY 10523 (914) 592-1944. Input: Software Publishing Corp.'s Harvard Presentation Graphic; Business & Professional Software's 3/5mm Expers; Imedia Corp.'s PC Presentation, Management Sound Presentation, Management Software, TSP Signer, Management Graphics (Canada) PC Silker; MAGICorp's Excallbut AT (MAGICORy's Sown Workstaller)

Dur AT (MAGICorp's own workstation).

Price: \$10 image processing charge with extra fees for copy depending on the type of output. Minimum order fee is \$50 plus delivery.

CPICLE 628 ON READER SERVICE CAPO

those with packages that support MAGI-Corp output. It licenses this technology to a number of other computer slide bureaus. To use any package supported by MA-

GlCorp, you must open ain account with the company and install and select the MAGIComm driver as an output device. This lest you save graphics as a graphic procedure includes an on screen work as the type of output and quantity desired. This information is transmitted to me of MA-GlCorp's three Production Centers, which are a Perkin Elmer indicomputer to reuse a Perkin Elmer indicomputer to to a \$225,000 Celco film recorder with 4,000-line resolution.

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Robin Raskin is a frequent contributor to PC Magazine.

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PRODUCTIVITY

■ PC LAB NOTES: A DOS TUTORIAL ■ ETHAN WINER

DIGGING DEEPER INTO DOS, PART 2

In this concluding installment, you'll learn about using ANSI.SYS, advanced uses of the DOS environment, and 3.2's fast and versatile XCOPY.

The first part of this article (PC Lab Notes, Volume 6 Number 4) covered commands-and the variety of options many of them accept-that were introduced with DOS, Version 2. In this issue I'll discuss some of the less obvious and less frequently used DOS commands and then conclude with the features that are unique to DOS 3.

THE THREE Vs Although the COPY command will accept a /V option that causes it to verify the integrity of a specific copy operation, the VERIFY command allows you to enable this useful feature until you reboot. Note that VERIFY may be entered directly from the command line or in a batch file. It can also be placed within your AUTOEXEC.BAT file. You can tum the VERIFY command on or off, as shown below-

VERTEY ON

ECHO.

VERIFY OFF If VERIFY is entered on the command line with no arguments. DOS will report

whether it is on or off, as it does with Entered at the DOS prompt, the VER command reports which version of DOS is currently running, and VOL displays the volume label for a disk, if it has one. Entering VOL alone checks the disk in the default drive, though of course any drive may

be specified, as in VOL. B:

BREAK Normally, DOS checks to see if Ctrl-Break was pressed only when it goes to the keyboard for input or sends characters out to the display screen. But by entering the command

BREAK ON

you tell DOS to check for the break key even while a program is running. One interesting feature of BREAK is that it may be entered from the DOS command line or a batch file, or may be placed within CON-FIG. SYS. Like VERIFY, if entered from the command line without ON or OFF. DOS will report the current Break status. Most users would do well to avoid the

PRODUCTIVITY INDEX

PC LAB NOTES Exploring hidden DOS features. PROGRAMMING/UTILITIES ASC.COM pops up a full ASCII chart over running applications programs. SPREADSHEET CLINIC

Copy ranges quickly; calculate running totals; add speed to macros. TURBO POWER USER A patch for 3.02A and tips on string searches and I/O choices.

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The .EXE format explained and a warning on using DEBUG to alter directory information.

BREAK option, which is mainly intended to allow programmers to break out of an unsuccessful compile or from a program assembly.

PROMPT You're much more likely to use the internal DOS command that lets you change the normal A> or C> prompt into nearly anything you'd like. Two of the most common applications of the PROMPT command involve displaying the current drive and directory and setting various screen attributes through AN-SLSYS. I'll get to that second one in a mo-

The general format of the PROMPT command is

PROMPT string

where string may consist of nearly any text or message you would like displayed. However, DOS provides a set of codes that simplify customizing the prompt. For example, besides showing the current drive or directory, PROMPT can also display the date or time, or the DOS version.

The complete list of available codes is given in your DOS manual, but some of the more interesting ones are shown below. PROMPT's special control codes are indicated by preceding each with a dollar sign. To show the current path followed by a greater-than (>) symbol, use

PROMPT SpSg

To show the current date, time, and drive on separate lines:

PROMPT SAS SES SES

(The underscore code means go to the next display line.)

Many of the things PROMPT can do are downright frivolous, and two of my personal favorites are shown below:

PROMPT B\$g

(Enter the 'B character by holding down the Ctrl key while striking the letter B.) And for grins, try this one too:

PROMPT YoYo\$hoo\$ho\$h

For clarity, all of the repetitions for this PROMPT command are not shown above. After the initial PROMPT YoYo, enter 13 groups of Shoo, followed immediately hy 12 groups of ShoSh. Trust me, it will be worth the trouble.

MORE ON ANSISNS In Part 11 discused the use of ANSI SYS in whiteprograms for PC "not-so-compatibles." But there are so many other things that the ANSI driver can do once you have installed it in your CONPIG.SYS file (see the sidehar "The DOS 3 CONPIG.SYS") that it has essentially become a complete programming language in and of itself. Unfortunated, IBM buried the information about ANSI SYS in BM buried the information about ANSI SYS in the DOS Technical Conference on the Conference of the Conference of the have access. Figure 1, together with the state of the Conference of the Conference of the Conference in the Conference of the Conference of the Conference of the state of the Conference of the Conference of the Conference of the System of the Conference of the Conference of the Conference of the System of the Conference of the Conference of the Conference of the System of the Conference of the Conference

The two main purposes of the AN-SLSYS device driver are to intercept special codes on their way to the display screen and to allow most of the keys on the keyboard to be redefined. While not nearly as convenient to use as Borland's Super-Key or RoseSoft's ProKey, keyboard macros can be defined and used with AN-SLSYS, though only to a point. Many programs (such as Lotus's 1-2-3) bypass DOS completely for keyboard input, and instead go directly to the BIOS or hardware ports. Those applications will not be affected by any key reassignments made through ANSI.SYS, since these changes affect DOS's input routines only.

All of the control codes that ANSI.SYS recognizes begin with the Escape character (bex. IB or decimal 27), followed immediately by a left bracket (I) and then by one or more numbers and/or letters. When multiple parameters are being entered, they

THE DOS 3 CONFIG.SYS

Desides the environment variables, DOS 3:2 maintains a wealth of additional internal information via statements that have been placed in CONFIG-SYS. Some of these new capabilities are very powerful and, consequently, quite technical in nature. A good example of DOS 3's ophistication is the SHELL statement, which allows specifying and artenate command interpreter, as opposed to COMMAND. COMMAND COMMAND.

The normal COMMAND.COM. for example, would not be appropriate for PCs such as those produced by Hewlett-Packard. In such machines, instead of using a command line, the entire operating system is based on HP's unique touchscreen interface. Similarly, a software developer might wish to create a selfbooting system in which COMMAND-.COM was not needed. Rather than require an AUTOEXEC.BAT file bring up the application, the developer could include the name of an alternate top-level processor within CONFIG.SYS, and it would gain control during the boot pro-APCC.

SHELL Specifying a replacement for COMMAND. COM is done with the SHELL statement, whose syntax is

SHELL = ALTERNAT. COM /P Notice that since DOS maintains the

name of the current command processor in the environment, it is essential that the replacement program be identified. Otherwise, when some programs terminate, the message "linsert COMMAND, COM disk" will be displayed, even though that is not the correct program to use. You inform DOS of this by using SET COM-SPEC, normally in the AUTOEXEC-BAT file.

SET COMSPEC - C:\ALTERNAT.COM

SET COMSPEC may also be used to tell DOS to look for COMMAND.COM in a place other than where the system was booted from. On a two-floppy system, it is a nuisance to have to insert a DOS disk in drive A: when some programs terminate. If you instead create a RAMdisk as drive C: at boot time and copy COMMAND.COM to it, this will never occur. (Although SET COMSPEC is supposedly usable in DOS 2, a bug in that version prevents SET COMSPEC from working correctly.)

Additional options when using SHELL as an entry in your CON-FIG.SYS file allow you both to specify the amount of environment space to be readed and no besigned that the relevant bough the discussion so far has centered on using SHELL to specify a COMMAND.COM replacement, it can also be used with the normal COM-amount of memory reserved for environment variables. The example below will establish the state of the control of

SHELL = C1\COMMAND.COM /E:512 /P

The /P option is needed to indicate that the specified setup is to remain permanently in memory, and also to run the file AUTOEXEC.BAT when it first begins.

DRIVER.SYS Another DOS 3.2 jewel is the DRIVER.SYS device driver. As explained in Part 1, alternate hardware driver programs may be specified by including their names within CON-FIG.SYS. But DRIVER.SYS is intended to solve a very different problem.

Many PCs that are equipped with a hard disk have only a single floppy drive. On those occasions when a floopy-to-floopy copy is required, DOS is smart enough to realize that any references to drive B: must actually be routed to drive A: And, of course, DOS always gives you a chance to swap disks whenever this "logical" drive has changed.

But what if you have a PC AT with both A: and B: drives and you need to copy a single file from one 1.2-megabyte disk to another? There's no problem using DISKCOPY, because it already supports changing drives in the middle. But before DRIVER.SYS, you couldn't ask DOS to pause while you swapped diskettes to cony to the same drive.

Like SÜBST and JOIN, DRI-VER.SYS lets you create an alternate identifier for a particular drive. If you have a PC AT with A: and B: floppies and a C: hard disk, you could refer to drive A: as drive D: by using the statement in Figure A. Let's look at each option in turn.

town turn. The first step is to inform DRI-VER.SYS which drive is being aliased. This is done with D:0, where the zero means drive A:. (Had you wanted to specify drive B:. a I would be used; 2 would mean drive C:. etc.) Next, the number of tracks drive A: has must be specified (T:80), followed by the number of sectors (S:/15) and the number of drive heads (H:2).

Though DRIVER. SYS is intended for use on any of the machines in the PC family, the \(\mathcal{C}\) option is appropriate only on an AT or compatible. (The drives in these machines contain extra hardware that can detect when the drive door has been opened and the disk changed, 17-lingly, \(\mathcal{F}\): It tells DRIVER. SYS the type of drive it is dealing with (0 means single- or double-sided 180/360K, 13-dicates 1, 2-megabyte capacity, and 2 is for the 39-i-sinch 730K types).

FILE CONTROL BLOCKS The FCBS statement is yet another configuration option new to DOS 3.2. It lets you accommodate older programs that were written using the File Control Block method of file access.

Before DOS 2 came along, it was up to the programmer to create an area in memory called a File Control Block (FCB), to hold information about a file. This is a tedious and thankless task that is not for the fainthearted. Fortunately, the current DOS versions allow assembly language programmers to refer to a file by name, which is much easier.

DEVICE = DRIVER.SYS /D:8 /T:88 /S:15 /H:2 /C /F:1

Figure A: A CONFIG.SYS entry to allow referring to drive A: as drive D:

The numing method, besides being simpler to implement, also require less system to implement, also require less system or proposition to the system of the system of the system of the require many files to be in use at once. As part of its normal services, DOS must keep track of how many files are currently in use and ensure that a program doesn't attempt to open more than can be accommodated by the memory set aside for this purpose. If this happens, DOS has no recourse but to fore opening the new ones. The syntax for FCRS lincludes two parameters:

FCBS m,n

The first number tells DOS low many local files may be in use at one time, and the backless may be in use at one time, and the backless of what a program requests. Since DOS may need to close a file without the approval of an application, some means of forcing certain critical files to remain open in seeded. If, for example, the first file that is opened contains contai

Along with some wonderful new features come a few headaches as well. The handling of hardware interrupts has been completely revised in DOS 3.2, and unfortunately, it is now up to the programmer to ensure that enough memory for the system stack has been set aside. This is done with the STACKS statement.

STACKS Each time a hardware interrupt occurs (such as a key being struck, or a COM port indicating that information is being received), the currently running program is suspended and control is nassed to a particular internunt handler.

In But DOS can't just drop what it's doing willy-nilly. Before it can interrupt one program to execute another, certain critical information must be saved. This includes the contents of the CPU's variable registers, segment registers, and flagor, called the stack. Since on interrupt orucalled the stack. Since on interrupt orutice can also be interrupted by another (a time can also be interrupted by another (a na) comes in the COM port), multiple stacks must be maintained.

The STACKS statement takes two arguments—the first is the number of separate stack areas to set aside, and the second contains the size in bytes of each stack. If you don't have a STACK Statement at all, DOS defaults to nine stacks, with each holding 128 bytes. To increase this to, say, 20 stacks of 256 bytes each, you would include in your CON-FIG.SYS the statement

STACKS = 20,256

Of course, nothing comes for free, and for each byte you dedicate for use as a stack, that much is taken out of RAM.

GOING BEYOND E: The final DOS 3.2 CONFIG.SYS statement to consider here is LASTDRIVE, which allows you to specify the number of phantom drives that may either be SUBSTituted or created with VDISK. Normally, memory is set aside within DOS only to accommodate drives A: through E:. However, if you intend to have many RAMdisks, then their drive letters will undoubtedly extend beyond E. For example, in a three-drive system (A: through C:) that has three RAMdisks and five substituted drives, a total of 11 drive identifiers will be required. Therefore, if this is to work, you must include the statement

LASTDRIVE = K in CONFIG.SYS.—Ethan Winer

■ PC LAB NOTES

must be separated by a semicolon.

The complete list of codes that the DOS ANSI.SYS recognizes, and their resultant action, are given in Figure 1, but to implement any of these commands, the codes must be sent to the display screen. For a programmer, this is easy-you just use the PRINT statement in BASIC, Write in Pascal, or Printf in C language. But how can the rest of us accomplish this?

When many codes are to be sent (for example, to create a number of keyboard macros), one method is to put the relevant commands into a text file and then TYPE that file as part of the AUTOEXEC.BAT start-up sequence. In the process of sending the codes to the screen, ANSI.SYS will receive and act upon them.

The other method is to include the codes as part of a DOS PROMPT customizing command, so they will be generated each time a program terminates. When ANSI.SYS is being used to create screen colors, this is the most effective procedure, since many programs after the display when they run.

Because ANSLSYS can be used to control the screen, many interesting and useful tricks are possible. Using PROMPT, for example, ANSI.SYS could be instructed to save the current cursor position, set the foreground and background colors, then locate the cursor in the upper-right-hand corner to display the date and time, restore the color to black and white, and finally return the cursor to the bottom left and display the current drive. The possibilities are endless, as evidenced by the continuing User-to-User submissions on the subject. Readers may also want to look at the PC Tutor in Volume 6 Number 3 .- Ed.]

Three examples will illustrate the use of ANSI.SYS. The first reassigns function keys F1 through F4, using a TYPEd file. The second displays the date and time as just described above. And the third combines the effect of the first two, but as a single AUTOEXEC BAT file.

Reassigning keys requires knowing their ASCII codes or, for extended keys (e.g., the function keys), their keyboard scan codes. This information is listed in an appendix at the back of the BASIC user's manual. Note that when an extended key is being substituted, a two-number code is used, and the first number is always a zero. Figure 1: The DOS ANSI-SYS command control codes.

To put the ANSLSYS codes into a file. you'll need a text editor that allows entering the Escape character. A few word processors (e.g., XyWrite) allow you to do this directly. I usually use Borland's Side-Kick because it accepts any control code and is always available with a single key. To enter the Esc key within SideKick, first press Ctrl-P (for printer code), and then

press Esc. For clarity, each of the sample function key reassignments are shown on a separate line, though they could just as easily be entered as one long string with no separating spaces. Refer to the ANSI codes in Figure l as you follow along.

The function keys will be assigned thus:

- F1 = "Dir A:" + <Enter>
- F2 = "Dir B:" + <Enter>
- F3 = "Copy "
- F4 = "Type

--- CURSOR POSITIONING COMMANDS

Cursor Locate: <Esc>[#:#H

> The first number specifies the row to go to, and the second specifies the column. If both numbers are left out, the cursor goes to the home position.

Cursor Up: (Rec) [#a

The number specifies the number of rows. If the number is omitted, the cursor is

moved up by only one row.

Cursor Down: (Egg) [#B

> The number specifies the number of rows. If the number is absent, the cursor moves

down by only one row.

Cursor Forward: <Esc>[#C

> The number specifies how many columns to advance, but will not go past column 88.
> If the number is left out, the cursor

advances by one column.

Cursor Backward: <Esc>[#D

> The number indicates how many columns to go backward, but will not wrap around

before column 1. If the number is omitted, the cursor moves one column.

Cursor Save: (Rec) le This causes the current row and column to

be saved in memory.

Cursor Restore: <Esc>lu

> This locates the cursor at the position it was when the most recent Cursor Save

command was used.

-- CLEAR DISPLAY COMMANDS

Clear Screen:

<Esc>|2J

This command clears the entire screen. and places the cursor at Row 1, Column 1.

Clear Line:

<Esc>|k

This causes the current line to be cleared from the current cursor position to the end. The character at the cursor position is also cleared.

---- GRAPHICS AND COLOR COMMANDS

Set Colors:

<Esc>[#m or <Esc>[#;#m or <Esc>[#;#m

The number of parameters may vary, and their meaning is as follows:

restore colors to white on black high intensity underscore on (monochrome only) blink on

inverse video on invisible on 38 Black foreground Red foreground Green foreground

33 Yellow foreground 34 Blue foreground Magenta foreground Cyan foreground White foreground

37 40 Black background 41 Red background Green background 43 Yellow background

Blue background Magenta background Cyan background White background

---- MODE SETTING COMMANDS

Set screen mode: <Esc>l=#h

The number indicates which video mode is to be activated, using these choices:

48 x 25 black & white text 48 x 25 color text

88 x 25 black & white text 88 x 25 color text 328 x 288 color graphics 328 x 288 black & white graphics

(Figure 1 cost

To make the reassignments, the following commands are placed in the file KEYS .SET that is typed:

<ESC>[0:59:"DIR A:":13p <ESC>[0:60:"DIR B:":13p <ESC>[0;61; "COPY "p

<ESC>[\$:62;"TYPE "p The first line begins by getting ANSI-

.SYS's attention with the Escape character and left bracket. Then, F1 is specified with 0;59 followed by the quoted text that is to be output each time F1 is pressed. Finally. the Enter key is indicated with the number 13, and the lower case "p" tells AN-SLSYS that the preceding was a key reas-

 To put the ANSI.SYS codes into a file, you need a text editor that allows entering the Escape character. I usually use SideKick.

signment command. The remaining lines continue the key substitutions for function keys F2 through F4.

To embed ANSI codes within the PROMPT command requires taking a different tack. In this case, a batch file will be used. Figure 2 shows the sample contents of PRMPT.BAT for use on a color-

equipped PC First the current cursor position is saved with < Esc>1s. Then the display colors are set to blue on red with <Esc>[34;41m. <Esc>11:50f locates the cursor on line 1. at column 50, and \$d \$t displays the date and time. Notice that \$d and \$t are part of the PROMPT command repertoire, and have nothing specifically to do with AN-SI.SYS. I've included a single space between the \$d and \$t to improve their readability. The color is then restored to normal white on black with <Esc>[0m, and the cursor is repositioned to where it had been with <ESC>[u. Finally, the PROMPT command \$n\$g displays the

■ PC LAB NOTES

usual drive and greater-than symbol.

If you're using a monochrome system, you may wish to change the "colors" to, say, highlighted and underlined by replacing <Esc>|34:41m with <Esc>|1:4m instead

To combine these examples into something you might put in your AUTOEXEC BAT file requires simply that the function key assignments be ECHOed to the screen. As you can see, this is not difficult, though you must bear in mind that how you generate the code shown as <Esc> will vary with your word processor or editor.

In DOS, to enter the Escape code, hold down the Alt key, hit 155 on the numeric keypad, and then release the Alt key. See

Figure 2 for PROMPT line.

REDIRECTING OUTPUT Normally, you use the keyboard to enter information to the PC. Likewise, when your PC has something to say, it uses the display screen. However, it is a simple matter to specify an alternate input or output source when needed. This concept is called redirection, and it opens the door to many interesting possibilities.

Consider the lowly DIR command. If you want to get a printout of a directory, while you could always use the Ctrl-PrtSc combination, this would also print your original command. Try this instead:

DIR > PRN

The greater-than (>) symbol redirects the output of the DIR command to the printer. If you have two printers and would like to use the second, you would instead enter

thus: DIR > LISTFILE.TXT

Even if no such file as LISTFILE.TXT exists when you type this command, DOS will create it for you and then place the filenames there. If a file by that name already exists, DOS will first erase it before placing the filenames there. If you should

6 648 x 288 black & white graphics 7 cause character wrap at end of line

Reset screen mode: <Esc>|#I

Same as Set mode commands, except that parameter 7 disables character wrap, causing any characters that continue beyond the end of the line to be ignored.

---- RE-ASSIGNING THE KEYBOARD COMMANDS

The general form of this command is:

<Esc)|0;8p</pre>
Where the first number indicates which
key is being re-assigned, and the second
indicates what it is to be replaced with.
Both numbers are specified using their
ASCII rodge.

Replace a single key with a string of characters:

<Esc>[#; "Your message here"p

Both atring literals and ASCII code numbers may be freely intermixed, for example to include a carriage return:

<Esc>|#:"Another silly message":13p

Extended keys are represented by two numbers--the first is always 0, and the second is the key's scan code:

<Esc>|8;68;"Fl8 types this measage"p

(Figure 1 ends)

PROMPT <Esc>|s<Esc>|34;41m<Esc>|1;58f\$d \$t<Esc>|8m<Esc>|u\$n\$g

Figure 2: A One-line batch file for color PCs that uses ANSI codes in the PROMPT command, want to keep the contents of LISTFILE | be assembled simply by redirecting the

and merely append the new information to the end of it, all you have to do is use two redirection symbols, thus:

DIR >> LISTFILE.TXT

Redirecting input is just as easy and, as you might imagine, reverses the orientation of the symbols. This has become a very popular way for programmers to enter programs into DEBUG, since it can eliminate a lot of repetitive typing. If a program is prepared outside of DEBUG first, it can

be assembled simply by redirecting the file like this:

DEBUG < PROGRAM. ASM

If changes need to be made, then the file can be brought into your text editor, modified, and redirected into DEBUG all over

again.

One caveat to observe when using this procedure is that all of the requisite commands must be in the file being used for input, including DEBUG's final Quit command. Since you're telling DEBUG that



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well.

XCOPY—THE DOS 3.2 TREASURE

Sometimes a new DOS version isn't much of an improvement over the previous one. At other times, however, the new DOS version contains a real gem. The XCOPY command in DOS 3.2 is one of these gems. XCOPY is an extended COPY command that includes some of the features of BACKUP. as

First, XCOPY is fast. XCOPY reads from the source disk as many files as will fit into memory, and only then writes the files out to the destination disk. COPY, on the other hand, reads and writes each file individually, continually switching back and forth between the drives.

Used with its optional /S switch, XCOPY will also copy files from nested subdirectories, creating any necessary new subdirectories on the target disk. While subdirectories are more common on hard disks than diskettes, you may have encountered some diskettes with subdirectories. XCOPY is excellent for making a copy of such a diskete, as with

or for copying all the diskette files to a subdirectory of your hard disk while maintaining the same directory structure:

XCOPY A: *. * C:\SUBDIR /S
where SUBDIR is a subdirectory of your
hard disk.

Similarly, if you need to copy a directory of your hard disk (including subdirectories within just that directory) to a diskette, XCOPY is ideal:

XCOPY C:\SUBDIR*.* A: /S

Sometimes you may want to copy only selected files from one disk to another. You could use COPY for each of these files individually, or you could use the /P (prompt) switch with XCOPY:

XCOPY C:\SUBDIR*.* A: /P

In this case, XCOPY will ask on a fileby-file basis whether you want to copy the file. You need only type a Y or N for your answer. Of course, you can use the /S and /P switches together. XCOPY is also useful for making backups. The /D switch followed by a date only copies files created or changed on that date or later:

XCOPY C:\SUBDIR*. * A: /0:84-15-87

only copies to A: those files created or changed on or after April 15, 1987. Another aid in backing up files is the file "archive" bit. The archive bit is part

Another and in backing up lites is the file "archive" bit. The archive bit is part of the file attribute. It is set to I when the file is first created and every time it is changed. When you use XCOPY with the /M parameter, XCOPY will only copy files with an archive bit of I. When

 Used with its /S switch, XCOPY will also copy files from

nested subdirectories.

it copies the file, it will set the archive bit to 0. The next time you use XCOPY with the /M parameter, that file would not be copied unless it had been changed in the interim.

You can thus use XCOPY to back up

your hard disk with the command: XCOPY C:*. * A: /S /M

When drive A: runs out of space, simply put in a new diskette and rerun the command. Those files already copied will not be recopied to the next diskette.

The advantage of using XCOPY instead of BACKUP for this chore is that the copies on the diskette remain normal, usable files. Copies made with BACK-UP must be restored using RESTORE before they are usable again.

—Charles Petzald

Charles Petzold is a contributing editor of PC Magazine.

its input is to come from this file, the keyboard will be completely ignored for as long as DEBUG is running. If anything is left out, there will be no recourse but to reboot.

Another important consideration when using redirection is that only those programs that use DOS for input and output will be affected. For example, Lotus's 1-2-3 completely ignores DOS in this regard, instead writing directly to display memory and reading keystrokes through the BIOS. Consequently, if you call up 1-2-3 using the redirection symbol, it will have absolutely no effect.

You can also take the output of one DOS command and redirect is into the input of another. This is called piping, and several programs are included on your DOS system disk that take advantage of this feature.

For example, to get a sorted directory listing to a printer requires three steps rather than two, as shown below. First the DIR command is given, then its output is redirected into the SORT program, and then finally it is sent to the printer.

DIR | SORT > PRN

In this case, the vertical bar indicates that the destination of the DIR command is not to go into a file named SORT, but rather is to become input for a program named SORT. The usual redirection symbol that follows SORT then indicates that its output is to go to the printer. Had you instead entered

DIR > SORT > PRN

DOS would have politely but firmly informed you of your error.

The MORE program is another DOS utility intended to be used with redirection. In DOS terminology such programs are called filters, since they modify the flow of data through a sequential chain of com-

mands.
While the DIR command has the /P option to pause when the screen becomes full, TYPE has no such counterpart. It would be wonderful if we could simply say

TYPE filename /P

but that just doesn't work. What will work, however, is to pipe the output of TYPE through the MORE filter, and let it take

PC LAB NOTES

care of pausing and prompting for a keypress.

TYPE filename | MORE

Again, the vertical bar is used so that the output of TYPE does not end up in a file named MORE.

One clever use of redirection is to suppress the extraneous messages DOS insists on displaying. Suppose you are creating a batch file that will install a series of programs onto a hard disk. Even if the batch file begins with the ECHO OFF command, the message 'I filled; copied' will be displayed on the screen after each programs is transferred. If you instead redirect the output of the COPY command to the the output of the COPY command to the will not be displayed. The correct form is

COPY A: * . * C: > NUL

It may not be immediately obvious that COPY has any output other than the very east of dupfixating a file, though if you think about it, it makes perfect sense. Sensibly, too, even when a command is redirected this way, any error messages will still go to the display screen. Thus, if you leave a drive door open, the familiar "Abort, Retry, Japone?" message won't end up in a file or be disregarded when redirection to the VLII. device is being used.

You might be tempted to think that copying to NUL could be used as a means to test the integrity of one or more disk files. It would seem logical to believe that if you entered

then each file would be read in turn, and if one of them were bad, DOS would tell you about it. In theory, it is a great idea, because it takes much less time to merely read a file than to actually copy it somewhere. However, the sad fair is that this miphy doesn't wow't. I don't know this miphy doesn't wow't. I don't know this DOS is doing when you tell it to copy a file to UVIL, but repeated experiments on a file to VILL, but repeated experiments on the which version of DOS I tried.

One of the most powerful uses of redirection is the little-known DOS CTTY command. I'll cover the basics here, but for a fuller treatment you should refer to

Stephen Manes's excellent article in the March 5, 1985, issue of PC Magazine

(Volume 4 Number 5).
Whereas the usual redirection symbols remain in effect only for the duration of the program invoked with them, CTTV lets you reassign your input and output more or eases permanently. One limitation with CTTV, however, is that both input and output must be reassigned to the same device. If you want to operate your PC from problem, you give use the COM port for input and output and enter from the DOS promoti

CTTY COM1

Once you invoke CTTY from the DOS prompt, however, there is no casy way to remove it, for anything you enter at the keyboard becomes literally a deal letter. Unless the remote device you have signed is itself capable of calling CTTY and specifying the CONsole, your only recourse is to reboot. What you can do, though, is to run CTTY from a batch file, and then have the same batch file cancel it later. Here's an example of a .BAT file that will do the job.

ECNO This message goes to the display screen CTTY COS!
ECNO this message is sent out the COM port do something here CTTY COS!
ECNO This message shows on the display ecreen

Whatever you do, don't try to Ctrl-Break out of a batch file like this one. If you do, DOS will ask you, "Terminate batch job? (Y/N)," and you'll have no way to respond!

DOS 3. With DOS 3 (and especially DOS 3.2) have come many new commands and features. I fike to think of these enhancements as falling into one of three categories: new commands (external programs, really), network support, and an enhanced environment (see sidebar "The DOS 3 Environment"). Let's take a look at some of these new commands first.

While using ANSLSYS to exchange keys will work only with applications that get keyboard input through DOS, the new KEYBxx programs that come with DOS 3 can be used successfully with all programs. (The xx signifies additional letters, such as IT for Italy, SP for Spain, etc.)
There is one trade-off, however only single keys can be exchanged. That is, you
can't create multicharacter macros that are
typed for you by pressing a single key. Of
course, the real purpose of KEVBxr is to
datow IBM PS to be used in foreign countries, though a clever user could create custom substitutions with DEBUG.

If the KEYB x; programs are to work on a color/graphics adapter (CGA), all of the foreign-language characters must be available—this is where GRAFTABL. Comes in Normally, only the regular AS-CII kttres, numbers, and punctuation are included on a CGA display adapter. But at the expense of a small amount of system memory, GRAFTABL will make the 128 foreign-language characters and symbols available for display, as well.

In the too-little too-late category is the DOS 3 ATTRIB program, which allows users to after the Read-Only and Archive attributes for a file. A file marked Read-Only is protected against being overwriter; a file whose Archive bit is set will be included the next time a Backup (or X-COPY; see the sidebar "XCOPY—The DOS 3.2 Treasure") operation is performed.

Since the beginning of DOS, attributes have been a part of each file's directory entry, though, unfortunately, IBM has never provided a means for users to access them. But while ATTRIB will allow changing these two attributes, it still does not allow modifying those for Hidden, System, Volume Label, or Subdirectory. You probably wouldn't want to mess around with those last two, but being able to hide files could certainly be useful. Consequently, I don't envision a lot of people using ATTRIB. since better programs are already available to do this. (The Norton Utilities contains one, as well as Charles Petzold's excellent ATTR program published in the June 10, 1986, issue of PC Magazine, Volume 5 Number 11.)

The new LABEL program is another example of IBM's trying to catch up with the rest of the world. Under previous versions of DOS, the only way to assign a label (name) to a disk was while it was being formatted. The DOS 3 LABEL command rectifies this, but it capitalizes everything you type, whereas Notton's version lets

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THE DOS 3 ENVIRONMENT

The environment first appeared with DOS, Version 2, but its sope and importance have greatly expanded with retease of DOS 3. Originally intended simply as a place in memory to hold system information (such as the current PATH or PROMPT), the environment PATH or PROMPT), the environment PATH or such as a general-purpose memory pool that all programs can access. Both DOS and non-DOS variables can be stored in the environment are by the programment of the programment of the programment of the programment of the programming languages.

The most common use of the environment is to store the search path that DOS uses to find a program you have asked it to run. With PATH, you are telling DOS asked of time, "Hyou don't find the program I asked for in the current directory (or drive), here's a list of places I want you to look." DOS then checks through the path you have specified before giving up and displaying "Bad command or file

Most PC users are quite comfortable with setting a path or prompt without even knowing about the environment and its SET command. But although both PATH and PROMPT may be entered with or without SET, if you want to use user-defined variables, they must be SET in the environment.

INVOKING BATCH FILES Once a variable has been stored within the environment, it may then be accessed from within hatch files by surrounding the variable name with a pair of percent sign who were batch file could invoke another by preceding the called BAT with COMMANDIC. There is another, abetimour requiring that a second copy of COMMANDIC COMB et nm.

Imagine that you have two batch files (I.BAT and 2.BAT) and that 2.BAT must be able to operate either alone or when called from within I.BAT. If we SET a variable into the environment with 1.BAT, then 2.BAT will be able to test that variable, and either return to 1.BAT when it finishes or merely end.

Here are the contents of I.BAT:

ECHO About to call 2.BAT SET COMESONE-YES

And here's 2.BAT:

CLS ECHO About to return if we were called IF &COMESCORES--YES 1

Of course, you could get much fancier with this method. For example, you could place the name of the batch file to return to in the environment, rather than merely set a flag.

Here's a modified 1.BAT:

ECHO About to call 2.EAT SET COMEHOME-46

And here's the corresponding 2.BAT:

CLS

ECHO About to return if we were called

If NOT PACOMENOMS—X SCOMENOMS

Notice how, in the third line of 1.BAT, its own name (%0) is assigned to the variable %COMEHOME%, so 2.BAT will know where to go when it finishes. Also notice the use of the NOT statement in 2.BAT. Since batch files don't have the luxury of a dedicated "not equal to" operator as in BASIC or Pascal, any arguments that are tested this way must be preceded by NOT. In this case, if the environment variable %CO-MEHOME% is empty, then 2.BAT won't attempt to return anywhere. But if %COMEHOME% has been assigned to anything at all, then 2.BAT will execute what it was set to.

AVOIDING ENDLESS CYCLES One additional complication with this approach is that the original batch file will begin execution at the beginning, when the second one calls it to return. This is

probably not what you had in mind, so again, the environment can be used to determine what to do. Here's a modified 1.BAT with such a test:

CLS
ECHO Test if we're returning from somewhere
IF NOT RECOMMINET—R COTO MORESTUTF
ECHO About to call 2.BAT
EST COMMINOR—18

ROND A called batch file ends us here

In this case, the first test the batch file must make is to determine whether it has been run from the called batch file or not. If the variable *COOMEHOME* is not empty, then this will be the case, and execution continues at the label *MORE-STUPF* But if *RCOMEHOME* is indeed null, then it is safe to assume that be batch file has just been run from the DOS prompt, and all of its statements are to be performed.

was personal conforment variables that you can create and the styround! applications programs can also examine the environment and use it as a common ground for communicating information. My contact at IBM suggests that this would have been a great place to store information about the type of display adapter that is installed. Of course, it's wownerful if the EAS had been designed to indicate its presence at power-up this way. Then any program or batch file could easily determine what type of monitor is being used, hot is the program or batch file could easily determine what type of monitor is being used, hot is the program or batch file.

IF %MONITOR%==EGA ...

Though we've only looked at reading our own environment variables, it is just as easy to examine those that are reserved for use by DOS. For example, you could test whether or not a path has been set by entering the following:

IF NOT EXPATES -- E ECHO SPATES

If a path is currently in effect, then this command will echo it to the display screen. Otherwise nothing will happen.—Ethan Winer

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you use both upper- and lowercase letters. Two programs that you'll never see in the public domain (or anywhere else) are JOIN and SUBST. These DOS 3 goodies allow manipulating disks and directories to accommodate older programs that can't recognize pathnames. Their predecessor, the DOS 2 ASSIGN command, lets you temporarily redirect any disk activity to a different drive, for example, when a program insists on using drive A: or B: for data. Under DOS 2.x. however, if you entered

ASSTON A=C B=C

DOS would route all requests for files on either drive A: or B: to the current directory of drive C:. Remember, many older programs were written at a time when people didn't have a drive C:. Consequently, users were often prohibited from entering C: as a drive to hold a program's data during installation.

But ASSIGN still didn't allow the use of pathnames. Enter SUBST and JOIN.

Like ASSIGN, SUBST allows you to create an "alias" for a given collection of disk files. Unlike ASSIGN, however, SUBST can substitute any directory, not just the current one, for a given drive identifier. A good example to consider here is the original WordStar program, which doesn't allow the use of pathnames.

Besides organizing different applications into separate directories, many people like to subdivide each directory into meaningful categories. Thus, while you might keep the WordStar programs in a directory called \WS, related groups of documents might be kept in subdirectories beneath the \WS directory. Personal correspondence would be in \WS\PER-SONAL, memos in \WS\MEMOS, etc. But once you have started WordStar from the \WS directory, it is impossible to get at those files, because a pathname is required to retrieve them. By using SUBST, each of the directo-

ries under \WS can be given a drive identifier such as D: or E:, either from the command line or as part of your AUTO-EXEC.BAT file. The example below shows how to do this.

SUBST D: C:\WS\PERSONAL SUBST E: C:\WS\MEMOS

Now, to call up your latest appeal for funds, you would ask for D:MOM.LTR. and DOS will look for it in the \WS\PER-SONAL directory instead. As you can see, SUBST may be used more than once to reassign several different directory names. Incidentally, SUBST is limited to drive letters only as high as E unless you override it with a LASTDRIVE command in your CONFIG.SYS file. (See the sidebar 'The DOS 3 CONFIG. SYS.")

To delete a drive substitution from memory, you enter SUBST with the /D option. The example below abandons the PERSONAL directory while leaving MEMOS intact.

To get a report on all of the current substitutions, enter SUBST with no parameters. and the various reassignments will be dis-

played. A useful application of SUBST is to minimize the number of characters in a PATH statement. If your list of pathnames is very long and detailed, substituted drive letters will let you pack that many more into the path command, as shown below. This example replaces what could have been a very long list of deeply nested directories to be searched.

PATH D:\:E:\:F:\:G:\:E:\:I:\

JOIN does exactly the opposite and lets you attach a disk drive letter to a subdirectory name. Note that the subdirectory you will be using must be empty, though if it doesn't exist, JOIN will create it for you. Here's how you can refer to drive B: as C:\STUFF instead:

Like SUBST, joined drives are removed with /D, and reported by entering JOIN with no arguments.

SELECT The last command I'll consider here is brand-new with DOS 3.2 and can greatly simplify installation for new users. Along with support for foreign-country keyboard and display capability, the DOS SELECT command lets you alter the date, time, and currency formats. In the past, you could simply make a backup copy of a new DOS disk and be done with it. Even if

a PC is equipped with a hard disk, the SYS command would take care of replacing an older DOS version with a newer one. But since DOS 3.2 has many more options than before, setting up for the first time can be an especially confusing process for

first-time users The SELECT command will format a disk (floppy or fixed), create CON-FIG.SYS and AUTOEXEC.BAT files containing specified country and keyboard codes, and copy all of the DOS programs in one shot. True power users will probably want to skip this one, because they could do the same thing directly. But for people who have never even turned on a PC (and may be reading the manual in a foreign language-English), SELECT will get a system up and running with the minimum amount of user intervention.

MORE BATCH FILE TRICKS Not every new DOS feature is an improvement. Many people have lamented the way DOS 3 handles the ECHO statement in batch files. Under DOS 2, a blank line could be sent to the screen by merely following ECHO with a blank space. That doesn't work anymore. Instead, you can use use the null character-CHR\$(255)-which you enter on the numeric keypad while holding down the Alt key. Don't forget to leave a space between ECHO and that character, or DOS won't recognize it.

Better still, instead of using ECHO (which requires an initial ECHO OFF to suppress the commands from being displayed), use REM followed by embedded backspaces. This requires an editor or word processor that lets you enter control codes, since a backspace will be acted on if you try it with COPY CON.

REM <Ctrl>=H<Ctrl>=H<Ctrl>=H<Ctrl>=H Be sure also to add three blank spaces

after the four 'Hs before you hit Enter, so as to overwrite the actual word REM. Speaking of REMs, another old trick that unfortunately doesn't work with DOS 3 is to use a single period rather than the word REM. This is a pity, since a period is much less obtrusive And while we're embedding control

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■ PC LAB NOTES

CD > \BATCH\MYDIR CD \LOTUS 123

COPY \BATCH\RETURN+\BATCH\MYDIR \BATCH\RETURN.BAT

Figure 3: A batch file that uses redirection to store the current directory for later return.

codes. The Norton Utilities comes with a cute program that will beep your speaker, with the idea that you include it in a batch file to indicate when something has finished. But it's just as easy to place the bell character—Cur\$(7)—in the file directly. And you don't need any tricks to do this either—iust press Ctri-G.

By the way, ECHO can be used just as effectively from the command line, for example, to send control codes to a printer:

ECHO <Alt>-155E > PRN

(Recall that the notation means hold down the Alt key while typing 155 on the numeric keypad. Then release the Alt key and hit

the letter E.)

When really long batch files are used, the time it can take to process all the lines

be annoying. Instead, call the batch file through COMMAND/C, and you can bail out at any time with EXIT, thus:

IF NOT EXIST filename EXIT

Another batch trick that many aren't aware of involves protecting important files. By using the EXIST batch command, you can see if a particular file exists on a target disk before overwriting it. This is particularly effective when combined with NOT, as you can see.

IF NOT EXIST BITHPT. COM COPY IMPT. COM BI

A copy will be made only if IMPT.COM

does not already exist on drive B: Saving the current directory is yet another trick that can be performed using batch file techniques alone. Though John Friend's excellent PUSHDIR and POP-DIR programs (Programming/Utilities, Volume 5, Number 10) can save and restore many levels of directories, such a heavy approach isn't always needed. Instead, you can use redirection to store the current directory in a file, and then retrieve it later when you're ready to return. The only extra step needed is to first create a small file (call it RETURN) that contains the letters CD followed by a single blank space (see Figure 3).

This assumes that you have a path to the directory where you keep your batch files. Of course, you could also substitute the name of any directory that has a path to it.

I hope that by presenting some of these infrequently used capabilities of DOS, your curiosity will be piqued enough to investigate further. These are powerful and truly useful features that can both simplify your computing chores and impart the sense of accomplishment that comes from using DOS to its full capacity.

Ethan Winer, an independent consultant, is the head of Crescent Software in East Norwalk, Connecticut.

between a GOTO and the :END label can

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INSTANT ASCII AT YOUR SERVICE



Here's the easy way to put a pop-up ASCII table of the entire IBM character set at your fingertips even when you've got an applications program running.

f dropping what you're doing to hunt up an ASCII chart is a frequent annovance, yet you don't want to blow nearly 40K of RAM on a certain well-known, sometimes-nettlesome utility. I've got a solution for you. ASC.COM is a compact, memory-resident utility that gives you an instant window into the whole extended (IBM) ASCII character set, complete with each character's decimal and hexadecimal equivalents.

You can pop up the window over a running applications program at any time, rapidly page through the ASCII table to find the code(s) you need, and pop back into your program without loss of data. Programmers especially will appreciate having this capability at their fingertips, and the source code listing (shown in Figure 1) provides several working illustrations of the methods and principles that underlie the programming of desktop software.

JUST ASC FOR IT As explained in the sidebar "Downloading ASC," the easiest way to obtain ASC.COM is by modem from the PC Magazine Interactive Reader Service. ASC.ASM, the assembler listing shown in Figure 1, and ASC.BAS, a BA-SIC program that will automatically create ASC.COM (see Figure 2), are also available without charge from PC-IRS. If you have no modem, of course, you'll have to key in the program yourself.

USING THE PROGRAM You load ASC once, at the beginning of a session, and it installs itself into its own private Figure 1: ASC. ASM, the source listing for ASC. COM.

block of memory. You might want to include it in your AUTOEXEC BAT startup file to make installation automatic. It consumes slightly more than 2.5K of RAM. With the program residing invisibly along-

side the rest of the system, pressing Alt-A pops up the ASCII window. Pressing Esc closes it and returns you to the parent program. The window can be called up from within any 80-column text mode, but not

jie ASCII teble elreedy diepleyed? jyee, then exit immediately jeneble interrupte

```
ASC for the IBM Personal Computer - 1986 by Jeff Prosise
kb dete
                    equ 68h
equ 61h
equ 28h
                                                                ;keyboard date port
;keyboard control port
;8259 end-of-interrupt velue
;8259 PIC port
;ecen code for 'A' key
kb_ctrl
eoi
int_ctrl_port equ 20h
a_key equ 30
elt_key equ 8
                                                                jehift code for Alt key
bioe_dete
                    eegment et 40b
                                                                (BIOS date eree
                    org 63b
dw ?
eddr_6845
bioe_dete
                                                                16845 Index Register eddress
code
                    eegment pare public 'code'
                    eecume ce:code
org 188h
jmp initielize
                                                                jump to initialization code
begins
                           notice
notice2
ibm_eigneture
edapter
video_page
border_ettr
text_ettr
                           db 1fh
                                                                jwindow text ettribute
jwindow beeder ettribute
heeder_ettr
window_row
                                                                grow of left corner of window
window_column
etert_value
                           db 3
db 8
                                                                jcolumn of left corner of window
jfiret velue in ASCII teble
jetetue of interrupt routine
jcureor ecen line definition
jold interrupt vector
int_etetue
cursor_mode
old_keyboard_int
                           dw 2 dup (?)
dw offeet initialize
                                                                pointer to ecreen buffer erec
eneble_veluee
                           db 2Ch,28h,20h,29h,
                                                                rvelues to enable CGA display
                           db 2Ah,2Eh,1Eh
db Dec Hex Cher Dec Hex Cher '
heeder_text
                                                                                     swindow heeder text
Front-end routine for the keyboard interrupt hendler. Execution is vectored there whenever an interrupt 9 is generated by the PC keyboard.
```

proc peer omp int_etetue,# PC MAGAZINE . MARCHIO. 1987 push sx push bs push cx

push dx push si push di

push de

in sl,kb_date

■ PROGRAMMING/UTILITIES

in the other video modes that the PC supports. Pressing Alt-A while in one of the unsupported modes won't burt anything but will simply leich no response from the computer. Fortunately, all but a few of the programs in which you night want to use the ASCII chart (Microsoft Word tunning in graphics mode is a notable exception) operate in the text environment and should pose no problem to operation.

The open ASC window displays 32 consecutive decimal and hexadecimal AS-CII values and the character that each rep-

 ASC divides the complete ASCII chart into "pages" of 32 characters and gives you several means to control which range is visible at any time.

resents. Because there are 256 ASCII character codes (including the null character, 0), they cannot all be displayed simultaneously within a single, small, unobtunsive window. ASC divides the complete ASCII chara into "pages" of 32 characters and their equivalents and gives you several means to control which range is visible at any time.

The PgUp and PgDh keys move the contents of the window backward and forward, respectively, one page at a time. If we have the content of the window between the content of the public will be content of the content of

When you press Esc to close the ASCII

```
,slt_key
                                                                  ;is the Alt key depressed?
                     ine sucl
Esit is echieved thru here when esecution is to be transferred to the normal
BIOB keyboard interrupt handling routine.
ésit:
                                                                  restore registers
                     pop da
pop di
                     pop dx
                     pop ss
jmp old_int_9b
short_esit:
                                                                  goto BIOS keyboard routine
, The key combination Alt-A was just pressed. Reset the keyboard end issue an ;EOI to the #259 PIC to enable berdwere interrupts.
éscli
                     csll kb_reset
                                                                  reset keyboard, and 8259 int
                     push cs
pop ds
push cs
                     pop es
ssaume da:code
Check the current video mode to see if it's one of the 68-column text modes (2, 3, or 7). If it is, then continue. If it's not, gracefully about this routine by esting thru an IRET.
                     mov ah,15
int 18h
                                                                  get video page and display mode
                     cmp el,2
                                                                  jvideo mode 27
                                                                 yes, then cootinue
                     cmp sl,3
je ssc2
                                                                  yes, then continue
pmode 7 (monochrome)?
                     cap #1,7
                     je saci
                                                                  yes, then continue
prestore register values for exit
done
                          de
                          C
                                                                  return to interrupted program
;Seve the current video page number and the cursor scan line parameters, ;set the interrupt routine stetus flag, and blank the cursor.
ésc2
                                                                  jseve page number
jset interrupt routine stetus fleg
jget the cursor shape
                     nov video_page,bh
                     nov int_ststus,1
nov sh,3
int 16h
                          cursor_mode,cx
                                                                 ;mave it .hide the cursor for now
                          ch,28h
Save the contents of the portion of the screen that will underlie the window.
                     cmp sdspter,0
                                                                  ;is this s CGA?
                                                                  no, then skip disable
idisable CGA video
ipoint DI to storage buffer
issve screen contents
                     call dissble_cgs
mov di,screen_buffer
csll save_screen
....
Pop the window border onto the display by writing directly to video. F things up by filling the blank window with the test of the ASCII table.
```

save registers

;get scsn code from keyboard ;wss the 'A' key pressed? ;no, then esit to normal routine ;get stete of shift keys

roop up the window border

(Figure 1 continues

	cmp adapter,#	rie thie a CGA7
	ine asc4	ino, then ekip enable
	call enable coe	reneble CGA video
aso4:	call fill_window	pwrite the window text
The winds	w is now displayed on the screen	. Wait for a keypress.
1		
esc5:	mov ah,8 iet 16h	jget a keyprese
	cmp al,#	rie it an estended code?
	ie ancle	yee, than jump
	Cmp el.27	rESC key praesed?
	jne eec5	ino, then get eeother keyprace
itestore t	he cursor, reset the etetus fleg	e original coetents of the ecreen, , and east to the application.
•	CMp adapter.#	shlank wideo if CGA installed
	jee oec6	
	call disable_oga	
asc6:	mov ei, ecreen_buffer	spoint SI to holding buffer
	call ractors_screen	graetora video memory coetenta
	cmp edapter,8	renable video if necessary
	ine sec7	
	call enable_coe	
asc7:	mov ah,1	rumblank the cursor
	mov cx, cursor_mode	idefine corsor ecan linee
	iet 18h	Justine collect come lines
	nov int_status,#	greaat stetus fleq
	jmp done	realt
A key he	been preesed that returned as	estanded code
1	o men presses that returned as a	acended code.
escl#:	Cmp ah,72	10p-Arrow praesad?
	ine eecll	ino, then jump to neat teet
	call ecroll_dowe	yee, thee ecroll down
	inp sec5	reture for another keyprese
secll:	Cmp ab. 88	Down-Arrow present?
	iee apcl2	Incent wires breezen
	call scroll_up	recroll window up
	imp esc5	tectory armon ob
asc12:	cmp ah.73	¿PqUp preesed?
anexa.	ine ascl3	tadob brassens
	call last window page	iflip window page back
	imp eecs	trith armon bade pack
ascl3:	cmp ah.61	;PqDn preesad?
meC131	ipe eacl4	11dou bissesso.
	call neat_window_page	flip window page forward
	inp eac5	lilib almona bade totasto
ascl4:	cmp ah,79	geed pranaed?
mecras	ine ascl5	tred breasent
	call end_window_page	flip to last window page
	imp aeci	lifth to fust atmoon bade
asc15:	cmp ab.71	;Homa prassed?
	ine asclé	yeo, than stort equie
	call first window page	leo, thee start admis
eerl6:	1mp asc5	jgoto firat window page
accies		slook for another keyprese
agcv16w	andp	

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(Figure 1 continues)

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|SAVE_SCREEN savee the coetasts of the screen beneath the window. |Setry: ES:D1 - buffer address save_screeo proc neer umn of window corner

mov dl,window_column	
mov bl,video_page	ggat video page in BX
aor bh, bh	
push di	raeva buffer eddrese
call video offsat	roat sterting address of window
mov ei.di	rtragefar address to SI
pop di	retrieva buffar eddresa
push da	ranve DS
mov da, video_segmant	jest DS to video segment
assume ds;oothing	,
mov ca,19	:19 lines to save
cld	icleer DF

138 words per line transfer one line to buffer redjust 81 for neet line pop ca loop savel get line count loop until does

■ PROGRAMMING/UTILITIES

window, everything is restored to the sate it was in when you originally pressed Alt-A. Data is intact, the portion of the screen below the window is restored, and to all outward appearances the original program was never interrupted. When you call up the ASCII table again, the page displayed will be the same one you tast accessed. I frequently find myself referring to one area will be the same one you tast accessed. Infrequently find myself referring to one area displayed to the control of the program of the p

 ASC will work with most programs, with the possible exception of some other resident utilities and nonresident ones that steal the keyboard interrupt.

same place without having to use PgDn after opening the window.

COMPATIBILITY ASC will work with most programs, with the possible exception of some other resident utilities like itself and nonresident ones that steal the keyboard interrupt for their own purposes. IASC.COM is compatible with the interrupt-stealing XyWrite III if you put that application's XYKBD.COM in your AU-TOEXEC.BAT file .- Ed. | Everyone knows by now that memory-resident programs have inherent problems in working with each other, so only experimentation will determine whether ASC will work with your favorites. Remember that the order in which such utilities are loaded often affects how well they coreside in memory. Since ASC.COM effectively steals Alt-A and doesn't let the BIOS (or the program that was interrupted) know that that key combination was pressed, it obviously conflicts with programs that assign a function to Alt-A. That combination in 1-2-3.

```
RESTORE SCREEN restores the contents of the screen beneath the window.
Entry: DS:SI - buffer eddrese
      eatore_screeo proc near
                                                  mov dh, window_cow
mov dl, window_column
mow hl, wideo_page
mov hh, bh
call wideo_offset
mov ee, wideo_segment
                                                                                                                                                             prov & column where window stert-
                                                                                                                                                             ;get video page in BX
                                                                                                                                                             ;get window starting address
;aet ES to video segment
;19 lines to restore
                                                   mov cx,19
                                                   cld
                                                                                                                                                             rclear DP
paave line counter
passed in counter
prectore one line
prector one line
prector one line
 restorel:
                                                   pueh cx
mov ce,38
                                                   rep movew
                                                                                                                                                             retrieve count
                                                   pop cx
loop restorel
 VINDLOFFERT calculates the offset eddress in video memory that corresponds in the given concealment of the present of the pres
     ideo offset
                                                  mov al,168
mul dh
shl dl,1
                                                                                                                                                               row * 168
                                                                                                                                                             recult in AX
                                                                                                                                                             jebyte in word to DX
jadd the two
jseve result in DI
;length of one wideo pa
;page * 1888h
                                                  enr dh,dh
add ae,de
mov di,ax
mov ax,1888h
                                                                                                                                                             page * 1888h
complete the offset address
                                                  mul be
 video_offset
 DISABLE_CGA cod EMABLE_CGA routines dischle and enable CGA wideo by writing to the Node Select Register at port eddrees 3DSh.
 disable_ope
                                                                                                                                                             pload Status Register address
yest video status
yestical retrace ective?
yoo, then wait until it is
pload MSR address
yealus to disable video
yeand it to the adepter
                                                   mov dx,3DAh
in al.de
   dischlel:
                                                   test el.8
je diseblel
aub de,2
                                                  mov el,25h
out dx,el
                                                  ret
 discble_cga
                                                  endp
 enable_cgs
                                                     ov ah,15
                                                                                                                                                             jget current video mode
                                                   int 18h
lea bx,es
                                                                                                                                                             joffset of enable value table
jget the value to enable vide
jload address of MSE
jOUT the enable value
                                                  alet
                                                               de,308h
 enable_cos
 PRE-RESET recets the keyboard and leaves an EOI to the 8259 PIC.
 kb_resat
                                                  prnc neer
in el,kb_ctrl
mov ah,al
nr el,86h
                                                                                                                                                             ;get current cootrol port value
;eeve it io AH
;eet hit 7
                                                  nut kb_ctrl,al
                                                                                                                                                             send reset value
                                                              kh_ctrl,al
                                                                                                                                                             paend it out to enable keyt
pauspend interrupta
pet SOI value
                                                               al, eoi
                                                                                                                                                                      end BOI to 8259
nable interrupta
                                                                 int_ctrl_port,al
                                                  40.5
kb_reset
 :BINZASC outpute a byte value to the screen in decimal or hexadecimal form. :Entry: DN.DL - row, column
                                                                                                                                                                                                                                    (Figure I conti
```

write_line

CONSULTATIONS Accelerator Boards

			Accelerator Boards
			Maynard Surprise! 199
, AL	- number to output - divisor (18 for decim		Surprise 286
	- divisor (10 tot George	al ootput, 16 for bex;	Megahertz TurboSwitch 125
bin2ssc	proc neer		
	pusb ee	jeave value to output	MicroWay ALL
	mor cx,ce	grero digit counter	Orchid CALL
binle	gor ah, ah	phyte to word in AX pdivide AX by 16 or 16	
DINII	pueb se	reeve AM (remeinder)	Ariel CALL
	inc cx	increment counter	
	eor ab, ab		
	or al.al	ivee the quotient eero?	EGA Cards
	jne binl	juse the quotient eero? ino, then go back for more iget digit to priot next	
bin2:	pop se	get digit to priot next	ATI EGA Wonder
	nov al, eb		Number Nine CALL
	or al,48	convert binery to ASCII calphanumeric hee digit?	
	cmp al,'9'	salphanumeric hee digit?	Paradise Autoswitch 399
	edd sl,7	ino, then jump shead iyes, then more conversion needed	
bin3:	mov ab, teet_sttr	set text stribute for write	Orchid ALL
		priot the digit	VEGA Video 7
	inc dl	sdvance cureor	VEGA VIGEO ,
	loop bin2	sloop until done	Mamaru
	pop sx	preetore value of AX	Memory
	ret	/1000010 Value	
bin2ssc	endp		AMI ELEPHANT 10 & 12 MHz!
,			HARDRAM
,		racter directly to video memory.	
JOUTPUT_CHAR	DL - row, column	racter directly to video memory.	Non Volatile EMS 359
Jancey: Da,	AL - sttribute, character		Tall Tree LOWEST!
1 741,	NE - SCCIIDOCE, CHSTECCEI		
outpot_cher	proc near		Maynard ON-Board 695
ootpool.	push dx push se	seve DX and AX	Maynard Maynstream (201) 095
	pusb se		
	mov bl, video_page xor bh, bh	get page in BX	Maynard Mouse (20) 149
	xor bh, bh		maj.and.moc.s
	call video_offset	colculate eddress to write to	
	cmp sdapter, 6	is this s CGA?	Software
	joe ootput3 mov dx,3DAh	ino, then skip wait loop iget CGA Status Register address	111
ootputl:	io al,dx	west until horie, retrace done	Above Disc
oorbarri	teet al,1	juste until notie. Tetrace done	
	ine ootputl		STSC APL395
	cli	secepend interrupte doring write	Statistics
output2:	io al,de	jusit for neet horiecotsl retrace	
-	test al,1		Statoraphics
	je output2		Execustat
output3:	pop ee	iget character and attribute	Execusial
	eti	prite them to video memory penable interrupts	
	pop dx	restore DX	PCB Layout
	ret.	liescole ny	FCB Layout
ootput_cher	endp		Ovation Schema 399
i contract	and,		
j			P Spice CALL
FILL_WINDOW	writes the test of the AS	CII table to the window.	
fill window			Winteck SmartWork 849
fill_window	proc near	set DE for first text row	
	mov dh,window_row edd dh,2	lest DE LOI LILET TEXT LOM	Doolston Dublishing
	mov al,start_value	cost first table value in Al-	Desktop Publishing
	nov ce,16	;qet first table value in AL ;16 lines to fill	
filll:	push cx	jasve line counter	Dr. Halo DPE CALL
111111	now dl.window column	sepecify starting column	Fancy Font
	edd 41.2		
		perite first balf of the line	JLaser+NEW!
		sedvance corsor for next half	Laser GL
	edd al,16	radjust AL for next half	
	call write_line	pwrite second half	LePrint Extended 249
	eub al,15 inc dh	pwrite second half ract AL for start of next line rect cursor for next row	
	inc da	jeet cursor for next row	Page Builder 350
	pop ce loop fill1	retrieve line counter	
	ret)Took micht capte terr	
fill_window	eodp		aE"
1			- MAPI
			COA.
WRITE LINE .	not puts one ASCII characte	and its decimal and bee equivalents.	RDVANCEDWARE IN 276 A Victoria Street Costa Mesa, CA 92627
Entry: AL	- ASCII code for charac	ter to optout	CV Programme Course
Dit.	- ASCII code for cherse DL - row, column to start	writing at	ADV 276 A Victoria Street
j			Costa Mesa, CA 92627

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(Figure 1 conti

proc neer nov es, video_segr cmp al, 188

■ PROGRAMMING/UTILITIES

for instance, can initiate execution of a user-defined macro. With ASC loaded, you'll get the ASCII window rather than the macro. All of the other Alt-key combinations should work as they normally do, however, so you only forfeit Alt-A.

HOW IT WORKS ASC is divided into two distinct sections. One is the code that becomes resident in memory and the other is the initialization portion. When ASC is first run from the command prompt, it begins by executing the initialization se-

INT 27h is issued to leave all of the code resident except for the initialization portion.

quence that sets the stage for the resident code to operate at a later time. A handful of tasks must be completed. First, because several of the video routines used to create. remove, and manipulate the ASCII window are hardware dependent, it must be determined exactly what type of video adapter is being used. Second, since ASC is initially set up for color, if the program is being used on a monochrome system, the values for the video attributes (the colors used in the window) and the video buffer segment address have to be modified. Next, the cursor is reset to its default power-on form (scan lines 6 and 7 for a color system, 12 and 13 for monochrome). This eliminates problems with some of the older Compac PCs, which seem to initially reverse the order of the starting and ending scan lines for the cursor in the BIOS data area. The vector pointing the way to the BIOS keyboard interrupt handling routine (interrupt 9) is saved and then reset to the address of the ASCII window routine. Finally, INT 27h is issued to leave all of the code resident except for the initialization portion, which is no longer needed once the program is installed in memory.

If you examine the source listing, you'll notice that when the DX register is prepared for the call to INT 27h by loading the

```
jee writel
inc dl
cmp el,18
                                                              pedvence egein if AL < 10
                    jee writel
inc dl
                                                             :set BL for decimel output
;output decimel text
;set cursor to next field
;edvance cursor if AL < 18h
                   cell bin2esc
edd dl,2
cmp el,1#h
                    jee write?
write2:
                   now bl -16
                                                             ;set BL for hex output
;output hexedecimel text
;goto next field
                   edd dl,2
mov eb.text ettr
                                                              set text ettribute
                                                              print the cherecter
                   cell output_cher
                   ret
write line
**DPEN_WINDOW drews the window horder onto the screen. Cherecter/ettribute ppeirs ere sent directly to video memory for fest displey speed.
open window
                  proc neer
                   now dh,window_row
now dl,window_column
                                                              get coordinates of window corner
                   nov es, video_segment
                                                              point ES to video buffer
                   cld
                                                             ;cleer DF for string operations
;get video page in BX
                   nov hl, video_pege
                   vor bh.bh
                   cell video offset
                                                              celculete sterting eddress
Write the top line of the window border to wideo.
                   mov al,218
                                                              satert with upper left corner
                   nov eb,border_ettr
                                                              ;set ettribute
                   nov cz,28
                                                              ido the next 28 cherecters
                   nov e1,196
                   rep stosw
mov el,191
                                                              ;do upper right corner
                   story
;Do the window heeder line.
                   edd di,lss
nov el,179
                                                              set DI for new line
sleft window border cherecter
                   stosw
                                                             perite it
                                                             point SI to text of line
;28 cherecters to write
;use heeder ettribute for these
;get the text cherecter
                   lee si,heeder_text
mov cx,28
                   now ab, hander_attr
lodsh
openlı
                                                              perite cher/ettr pair to video
prepect for ell 28
                    stosw
                    loop openl
                   now ah, border_ettr
                                                              ;do rightmost column
                   nov el,179
    w write the next 16 lines (no text) to the display.
                   edd di.les
                                                              set DI for new line
                   nov cx.16
                                                             :16 lines to do
onen2+
                   push cz
nov al,179
now ah,border_ettr
                                                             ;seve line counter
;do leftmost column
                   stos
                   nov e1,32
                                                             ;do next 20 columns (blenk)
                   now ab,test_ettr
now cx,28
                   rep stosw
mov al,179
mov ah,border_ettr
                                                             ;do rightmost column
                   edd di,les
                                                             redjust DI for next line retrieve counter
                   pop cx
loop open2
                                                             ;loop until finished
Finish things up by writing the lest line.
                   mov al,192
                                                             plower left corner
```

mext 28 cherecters

plower right corner

(Figure 1 continues)

stosy

nov cx,28 nov al,196

```
ret
open_window
SCROLL_UP ecrolle the window contents up one line.
ecroll_up
                   cmp etert_value,224
                                                         toen we ecroll more?
                                                         ;no, then do nothing
;uee INT 18h to ecrol1 up
;one line
                  ja ecrupi
                  cell define_window
mow bh.taxt_attr
                                                         jact CX end DX for acroll
                   int 10h
                                                         pacroll up
padjust starting value
posiculate new velue to write
                   inc atert_value
                  roy al, etert_value
                  edd e1.15
                  mov db,window_row
                                                         determine row to be written to
                  add db 17
                  mov dl,window_column
edd dl,2
                                                         set sterting column
                                                         pwrite the first half of new line pedjuet AL
                  cell write_line
add al,16
edd dl,5
                                                         move cursor to next half of line
pwrite eecond balf
                  cell write_line
acrupl:
acroll_up
SCROLL_DOWN ecrolle the window contents down one line.
scroll_down
                  proc near
                   cmp etert_value,#
                                                         cen we acroll more?
                  je ecrdni
nov ah,7
                                                         ino, then do nothing jue INT 18h to scroll down
                                                         jone line
jeet CX end DX
                  cell define_window
                                                         reet ettribute
                  nov bh.text_ettr
                   int 10h
                                                         ido the ecroli
jedjust sterting velue
incw value to write
                  dec stert_value
mov al,start_value
                      dh,window_row
                                                         determine row for write
                  mov dl.window_column
edd dl.2
                                                         seet eterting column
                   call write_line
                                                         swrite new line et top
                  add el,16
                                                         redinat AL
                                                         spoke cateor
                  call write_line
                                                         jwrite second half of line
acrdnlı
                  ret
acroll_down
LAST_MINDOW_PAGE pages the window back one page.
last_window_page proc neer
                                                         ;can we go back more?;no, then do nothing;starting value > 317;yea, then jump;no, then eero value
                  cap start_value, 0
                  je lest3
                   cmp_etert_velue,31
                  je leatl
                  nov start_value, #
jmp last2
sub start_value. 3
                                                         ;no, then eero value
;akip next line
;edjust START_VALUE
lastl:
                       etart_velue,32
                  cell cleer_window
                                                         cleer interior of wind
leet 2 +
lest3:
leat_window.
               page endp
NEXT_WINDOW_PAGE pages the window forwerd one page.
next_window_page proc neer
                                                         ;cen we go forwerd more?
;no, then do nothing
;aterting velue <193?
                  cmp start_value,224
                   je next3
                   cmp start_value,193
                  jb next)
                                                         yea, then jump
                    ov atert_velue,224
                  jmp next;
                                                         jekip naxt line
nextl:
                       etart_value,32
```

pext2:

next_window_page endp

call clear_window call fill window

FIRST_WINDOW_PAGE flips the window contents to the first page.

address of the first byte that is not to be left intact, an extra 1,140 bytes are claimed. There's a good reason. A window 19 rows high and 30 columns wide comprises 570 characters. Each character is represented by 2 bytes in memory, one the code for the character itself, the other for its attribute. Space must be reserved somewhere to save the contents of video memory that will be replaced by the window so that the original screen display can be restored when the window is closed. Normally you might just set aside some room adjacent to the area where you store variable values (i.e., just after the first instruction in the .COM file), but doing that has two drawbacks. First, it lengthens the file image stored on disk; worse, it increases the number of DATA statements in a BASIC program built to create that file. By reserving the necessary space just beyond the code that becomes resident upon execution of interrupt 27h, instead of by explicitly locating it within the code at assembly time, you can solve both problems at once.

Once resident in memory, ASC six quickly in the background and watches for a preas of Alt-A. Any other keypress a pressed on to the normal BIOS interpretation to be processed as usual. When the program. Here the keyboard is reset (so that further keypresses can be sensed) and the video mode is checked against a list of the PC's 8B-Outmin video mode. If the mode is acceptable, execution continues in Alt-Ah and no been pressed.

Before the window is opened, a couple of vital parameters must be obtained and recorded. The current video page number and the starting and ending scan lines for the cursor must be determined. The active page must be known so that all video calls can be addressed to it, and the shape of the cursor must be determined so that, after it has been blanked, it can be restored later in the same form.

The window is physically popped onto the screen in three phases. First, the contents of video memory beneath where the window will appear are saved to the buffer area that was set aside beyond the last byte of resident code. Next, the border of the window is drawn. And finally, the text is

(Foure I continues)

clear window pwrite new text page

■ PROGRAMMING/UTILITIES

filled in. There are a couple of interesting points here.

To give the program a "professional" look, you want it literally to pop onto the screen. That means writing it up there faster than the eye can follow. This requires writing the border on the screen, not through BIOS video calls (which are not rously slow), but with direct, unchecked writes to video memory. This presents a problem, however; unregulated accesses to video memory on a color/graphics adapter (CGA) cause unsightly snow to

■ To give the program a "professional" look, you want it literally to pop onto the screen. That means writing it up there faster than the eye can follow.

flash momentarily across the screen, and this looks even worse than having a window slowly paint itself into existence. So, if the video adapter is a COA the program knows this, thanks to the initialization route. Inches the storage of the program knows this, thanks to the initialization route. Inches the storage of the program of unblank is when the writing is finished. You II see a slight flicker, but the window seems to appear instantly and the display is free of dasplay adapter (MDA) and an enhanced graphics adapter (EGA) can be freely mainquitated without causing such video interference.

There are a couple of other ways to write directly to CGA video and still avoid interference. You can safely access video memory during either the vertical or the horizontal raster scan retrace cycles. Status bits in the CGA Status Register (port address 3DAh) tell you when a retrace is in progress by going high during its short duration. A vertical retrace lasts long enough to send several physics or works to video an still flor risk out-

```
firet_window_page proc near
cmp start_velue,#
je firatl
                                                          salrandy at beginning?
syee, then do nothing
staro ctarting velue
                  mov start_value,#
                  call clear_window
call fill_window
                                                          clear window
first1.
                 paga ends
first_winds
JEND_WINDOW_PAGE flipe the window contants to the final page.
and_window_page proc near
cmp start_value,224
je andl
                                                          yea, then do nothing
jeet START_VALUE to maximum
                   mov start valua.224
                                                          clear window
pwrite window text
                   call clear_windo
cell fill_window
and_window_page_endp
CLEAR_WINDOW clears the interior of the window.
clear_window proc near
mov ab,6
mov al,8
call defina_window
                                                          juse INT 18h to clear window
jcode for hlank function
jest CX and DX
                  nov hh, taxt_attr
                                                          rast attribute for cleered eras
                   int 10h
                                                          perform the cleer
                   ret
cleer_window
                 endp
|DEFINE_WINDOW sate the values of CX and DX for call to BIOS acroll functions.
defina_window proc near
mov ch,window_row
add ch,2
                                                          idefine upper left corner in CX
                  mov cl,window_column
add cl.2
                  nov dx, cx
                                                          idefina lower right corner in DX
                   add d1,25
dafing window
INITIALISE performs a variety of tasks to set the stage for the resident part
jof the program.
                  proc near
; See if the display adeptar is an EGA by looking for the EGA BIOS eignature.
                  nov ex. #CPPPh
                                                          ant ES to EGA Blos eeqmant
                  nov ea, ax
mov di, 1Eh
                                                          ppoint DI to signatura locetion
ppoint SI to 'IBM' text
pthrea bytas to compara
pcheck three bytas
                  lea si,ibm_signatura
mov cx.3
                   rape capab
                   ie initi
                                                          jump if EGA signatura found
The display edapter is not on EGA. Determine whather it's a CGA or an MDA.
                  nov edapter.0
                                                          seero ADAPTER for CGA
                  mov eh,15
int 18h
cmp al,7
                                                          ;get video mode
                                                          sin it mode 75
                                                          ;no, then it's a CCA - jump
;yes, it's en MDA - est ADAPTER
                   inc adapter
ilf this is a monochrome system, modify color-dependent values eccordingly.
initl:
                  cmp el,7
                                                          ;ie currant video mode 7?
                                                          yee, then brench
                  je init2
                                                          yjec current video mode 15?
yno, then akip modification code
yest VIDEO_SEGMENT for monochrome
ychanga attributes for monochrome
                  cmp el,15
jne init3
auh vidao_seq
ini+2.
                                       at sook
                  mov horder_attr,7#h
```

mov text_ettr,87h mov header_ettr,87h

init4:

; :Reset the cursor to ecen linee 6 end 7 (color) or 12 end 13 (monochrome). inita.

mov cx,8CSDh ;monochroms cursor type ;video mode 7? ;yms, then jump ;video mode 15? ie init4 cmp el,15 je init4 yee, then jump scan lines 6 and 7 for color mov cx,8687h mov eh,1 int 18h

Now save the old interrupt 9 vector end replace it with one pointing to the scode that we will leave behind in memory.

mov ah,35h mov al,9 int 21h mov old_ksybosrd_int,bx mov old_ksybosrd_int[2],ee mov ah,25h jget current interrupt 9 vector

; seve vector offsst ; seve vector segment mov el.9 lee dx,secview point it to body of program

set cursor type

Exit thru INT 27h end recerve enough room beyond the actuel code to etore the scontente of the eree of ecrsen that underlies the pop-up window.

mov dx,offset initialize+1148 ;rsssrvs spacs for cods end buffsr int 27h ;tsrminats-but-etsy-rssident

initielise cods

end begin

(Figure 1 ends)

lasting the cycle. Horizontal retraces occur much more frequently than vertical ones but are very short and are best suited for spitting out one quick character.

BIOS character output routines write during the horizontal retrace. ASC uses a custom character/attribute write routine very similar to the BIOS routines to send the text of the window to video memory. Why use a custom routine? For one thing, of course, custom code written reasonably well will be considerably faster than INT 10h routines.

A second, and perhaps more important reason, is this: ASC avoids the need to save the cursor position before the window is called up because direct output routines don't require you to move the cursor in order to write characters. All that must be done when the window is closed is to unblank the cursor, and it will reappear where it was before Alt-A was pressed. But if the BIOS output routines are used, the cursor must be moved. So what? It might seem simple just to get the cursor's position through INT 10h and save it, but

DOWNLOADING ASC

the programs that appear in our Programming/Utilities column (as well as other programs we publish) can be downloaded by modem from the PC Magazine Interactive Reader Service. There is no charge for this service, but users are cautioned that these programs are convright material and are made available only for individual, noncommercial use. Making copies for others (including placement on other electronic bulletin boards), with or without charge, is a violation of the Ziff-Davis copyright.

The modern number for PC-IRS is (212) 696-0360. Set your modem and communications software to use 1,200 (or 300) bits per second, 8 data bits, I stop bit, no parity. PC-IRS files with a .COM, .EXE, or .ARC extension require that you also use the Xmodem error-checking protocol; our other files (e.g., with extensions of .ASM or .BAS) can be downloaded using either regular ASCII or Xmodem transmission.

ASC.BAS, whether typed in from the magazine at your keyboard or downloaded from PC-IRS, will automatically create ASC.COM when run once in BA-SIC. ASC.ASM, also listed both here and on PC-IRS, allows you to modify the

ASC AT A GLANCE

Syntax:

[d:][path]ASC

ASC is a memory-resident utility that displays the extended ASCII (IBM) character set, with corresponding decimal and hexadecimal codes. It works with MDA, CGA, and EGA displays in text mode

Once loaded, either at the command line prompt or via an AUTOEXEC .BAT file. ASC is invoked with the program but requires you to use a macro assembler (IBM or Microsoft) and the following commands:

MASM ASC: LINK ASC EXE2BIN ASC ASC. COM

Alt-A key combination. Its pop-up window overlays any currently running application, to which return is made by pressing the Esc key. Home/End, Pg-Up/PgDn, and Cursor Up/Down keys are used to move from one part of the ASCII table to another.

Apart from reserving Alt-A for its own use, ASC.COM is compatible with most applications, although conflicts may arise when using other terminate-but-stay-resident utilities or with programs that themselves appropriate the keyboard interrupts.

PROGRAMMING/UTILITIES

```
REM -- BASIC PROGRAM TO CREATE ASC. COM
     OPEN "ASC. COM" AS #1 LEN = 1
110
      CHECKSUM - 8
      FOR I = 1 TO
          LINESUM - 8
FOR J = 1 TO 8
150
170
               READ BYTE
168
               CHECKSUM = CHECKSUM + BYTE
LINESUM = LINESUM + BYTE
               IF (BYTE < 256) THEN LSET AS = CHRS(BYTE)
PUT #1
200
          NEXT J
READ LINECHECK
          IF LINECHECK CO LINESUM THEN PRINT "Error in Line", 288 + 18 * 1
      IF CHECKSUM = 117531 THEN PRINT
PRINT "COM file is not valid!";
DATA 233, 29, 4, 61
                                                      Successful Completion!
                                                                                        : EMD
                                                 67
      DATA
                 185,
                           183,
                                                116
                                                                    192
                                                                               57,
                                                                                          56,
                           118,
                   97.
                                                           32.
                                                                     00.
                                                                                          98.
                                                                                                   762
338
348
      DATA
                 100,
                            185,
                                                104
                                                          185,
                                                                    110,
                                                                                        32,
      DATA
                   97,
                            189,
                                                                                        121,
                 111,
      DATA
                            115,
                                                115
                                                          101
                                                                                          66,
      DATA
390
400
                   1
                                                                                0,
                                                                                          41,
                                                  5
                                                                      40;
      DATA
                             42,
                                       32,
46,
                                                 30
                                                                     68
                                                                              101.
                                                                                          99.
418
                                                           32.
428
438
      DATA
                 32,
                             72,
32,
                                      101
                                               128
                                                          32,
                                                                     67
                                                                              184,
                                                                                          97,
                                                                                                   625
558
448
      DATA
                 101,
                            128,
                                      32,
62,
83,
96,
22,
                                                          184,
                                                                     97,
                                                                                          32,
                                                                                                   667
                 251,
                                                           82,
                                                                                                   468
                            88,
228,
205,
                                                81,
68,
168,
                                                                                        30,
180,
      DATA
                   6,
                                                           30,
488
                                                                                13,
     DATA
                 31,
                                                 90
                                                          89,
232,
                                                                     91,
                                                                                          46,
14,
68,
                             95,
500
                                                                                                   789
518
528
      DATA
                   31,
                           116,
                                      17
                                                           15,
                                                                    285,
                                                                                                   528
387
                                                                    95,
62,
180,
      DATA
                                      9,
88,
83,
                                                                                94,
76,
3,
                                                                                          90,
                                                                                                   449
                 89,
198,
16,
32,
117,
                                                287
                           137,
285,
3,
     DATA
                                                 84
                                                                                        181,
      DATA
                                                           62
                                                                    73,
                                                                                          ...
                                     232,
                                                                                62,
                                                                                                   882
     DATA
                   62.
                            232,
                                                  0,
                                                          232
                                                                              232
                                                                                        128,
590
                                     130,
                                                                    183,
      DATA
                                                                     3,
8,
27,
                                     84,
116.
618
                   68.
                           232
                                                          180,
                                                                              205,
                                                                                        22,
                                                                                                   724
                                                 46
                                                                                        232,
                                     73
                                                 54,
                                                           90.
                                                                              232
                 232,
650
     DATA
                            128,
                                      62,
                                                 73,
                                                                       .
                                                                              117,
                                                                                          3,
                                                                                                   384
     DATA
DATA
DATA
DATA
DATA
DATA
                                                                    139,
                                                                                        84,
232,
117,
252,
172,
                                                188
198
252
                                                          72
128
                                                                                14.
                                                                                                   842
510
678
                            205,
                 235.
                                                                     83,
                                                                                                 1178
1832
1252
690
                  26,
                           232,
117,
252,
162,
                                               192
                                                                              88,
128,
235,
                                                                     252,
                                                          235,
                                                                    102,
                                               232
                                     01,
120,
235,
                                                                                                   895
                                               117,
252,
152,
                                                          79
128
                                                                                83,
                                                                                        232;
117;
                                                                                                 988
738
748
      DATA
                           232,
      DATA
                                                                    252,
758
                 3,
88,
76,
139,
185,
                                      97,
138,
58,
                                               22,
                                                          235.
                                                                              138.
                                                                                          54,
30,
     DATA
                                                           81,
                                                                    232
788
      DATA
                                       95
                                                                    38,
                                                                                74,
                                                                                           1,
                                                                                                   758
752
                                                 3.0
                                                          142,
     DATA
                                     131
                                               252,
888
                                                          100,
                                                                                                 1396
                                     138
                                                           88,
76,
                                                                     74,
                                                                                        22,
255,
185,
     DATA
                            21
                                                                                                  632
                                                                                1,
    DATA
                                     252
848
                           131,
168,
                                               81,
188,
238,
                                                          185,
                                                                                        243,
195,
246,
                                     199,
                                                          89,
288,
184,
186,
                                                                              244,
                                                                                                 1349
     DATA
DATA
DATA
                 227
                                     139,
                                               248,
                                                                                        247,
                                                                                                 1831
                            194.
                           238
                                                                    234,
                 168
                                               251,
                                                          131,
                                                                                                 1000
    DATA
                           92,
                                      97
                                                          186,
                                                                                        238,
                                               215,
                                                                              128,
176,
                                                                                                 981
```

there's a catcb. Some "ill-behaved" programs, 1-2-3 being a sbining example, manipulate the cursor by writing directly to the video controffer chip on the adapter. Such programs don't bother to keep the BtOS informed of the cursor's whereabouts. That makes it extremely difficult to find the true location. Since ASC COM never moves the cursor, then, the problem of finding and saving its position doesn't

With the window present on the display, ASC enters a loop that solicits keystrokes and acts on those that have functions assigned to them. PgUp, PgDn, Home, End, Cursor Up, and Cursor Down all send signals to change the range of currently shown ASCII values appropriately. A press of the Esc key ends the loop, closes the window (by writing the saved contents of the screen from the buffer area hack out to video memory), and redisplays the cursor. (Again, if a CGA is in use, the display is hlanked during video memory accesses.) Once more, ASC silently sits bebind the seenes, monitoring the keyboard for a press of Alt-A to signal that its services are again required.

AN INTERESTING ALGORITHM One routine in the program is worth a closer examination BIN2ASC, short for hinary to ASC11, is the output routine that converts a binary value into decimal or bexadecimal text and prints it. The value of BL on entry to the subroutine specifies the form of the output. If BL = 10, output is decimal, and if BL= 16, output is bex. The basic algorithm for such conversions is as follows: Divide the binary value by the base (in this case 10 or 16), and the remainder will be the rightmost digit in the number. Push the remainder onto the stack and compare the quotient to zero. If it's zero, you're done; if it's not, you take the quotient as the primary value and loop back to divide again, repeating the process until you finally obtain a zero quotient. You now have the binary value of each individual digit of the originat number stored on the stack. By consecutively popping them off. ORing them with the value 48 to convert the binary digit to ASCII (and adding 7 if it is a hex atphanumeric digit), and then printing in left-to-right lashion, you have successfully output the number in text form. It's actual-

238.

138

32.

tom

258.

Imagine Audubon's *The Birds of America*. Without the pictures of the birds.

As a database, it would still be helpful. But not nearly as usaful.

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ly simpler than it sounds, as you can verify by looking at the source listing.

MODIFYING THE PROGRAM One heretofore unmentioned hook was built into ASC to allow you to pull off a neat trick. If you should ever need to have more than one ASCII window present on the screen simultaneously, you can load the program more than once, in which case successive presses of Alt-A will pop up additional windows. You can modify the COM file with DEBUG to change the location at which the window appears to prevent multiple windows from covering each other up. Two bytes, located at offsets 150h and 151h (labeled WINDOW_ROW and WINDOW_COLUMN in the source code), determine the placement. Change these to the row (0-24) and the column (0-79) you want to assign to the upperleft-hand comer of the window, and you're all set to transform ASC into a limited

multiwindow facility. You can also change the window colors very easily. Three bytes, labeled BOR-DER_ATTR, TEXT_ATTR, and HEA-DER_ATTR in the source and located at offsets 14D to 14Fh, hold the attribute values used to create the window border, text. and header line. Changing those bytes alters the color scheme. You might be interested in these if you have a monochrome monitor connected to the composite video output jack of a CGA. Although a program can tell what kind of video adapter is installed, it can't tell what kind of monitor is attached to that adapter. If you're using a composite monochrome display and have difficulty reading the window, change the attribute bytes to the values 70h, 07h, and 07h, respectively, for maximum contrast and definition.

If you're a programmer, I hope you'll use ASC.COM as a guide in creating your own resident utilities. An interesting challenge would be to customize the program to allow the window to be moved around the screen in real time using four keys of your choice, creating a true multiwindow effect. In any case, here's hoping that ASC.COM becomes a permanent addition to your library.

Jeff Prosise is a frequent contributor to the

39 (Figure 2 ends)

Programming/Utilities column.

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SPREADSHEET CLINIC



Indirect addressing in 1-2-3 macros, quick copying without macros, undocumented uses for F3, calculating running totals, using a mouse with SuperCalc4.

VARIABLE ADDRESSES IN MACROS Both Sympliony and Release 2.0 of 1-2-3

allow you to write macros that specify addresses indirectly. This lets you change the operation of a macro by changing the contents of one or more cells

Three examples of this are shown in Figure 1. All are string formulas that result in macro statements that refer to other cells for instructions on how the macro should operate. The first example is a simple {goto}, except that the address to which the cursor is to go is whatever is contained in cell A1

It is important to realize that when this formula is actually entered into a cell it will look different. For example, if cell A1 contained the string D18, the formula would be displayed as {goto}D18 -. This string of text would operate as a normal macro statement. The advantage of writing the macro statement as a formula rather than as a label is that whatever appears in cell A1 will be reflected in the macro statement and so will affect the way the macro operates. The location to which the statement sends the cursor can thus be affected by anything that affects cell A1.

The second formula uses the same technique to specify a subroutine to which the macro should branch. In this case the macro branches to "FRED", but FRED is not the name of the subroutine itself. Instead, the cell named FRED contains a text string that is the name of the subroutine. Thus, if the cell named FRED contained the word PRINT, the macro statement would hand over operation to a subroutine named PRINT. By changing the contents of FRED, you can select a different subroutine to which the macro will branch.

The third example uses a string formula to display a macro statement that copies one range to another. Once again, the "from" and "to" ranges are not LOCI and LOC2, but the addresses contained in the cells that bear these names. As the con-

tents of LOC1 and LOC2 change, so will the operation of the macro. There are virtually unlimited uses for this approach to indirect addressing. It allows great flexibiliy in macro control.

Fred Rosen New City, New York

This is a sophisticated macro-writing techuique that uses formulas that act, in macros, just like labels. As Mr. Rosen points out, the display is markedly different from the formula, so be alert when you debug a macro that uses string formulas. The underlying formula may be visible only by

> +"(goto)"&+Al&"-" When I use a spreadsheet, I often find I

(2) +"(branch "s+FREDS")"" +"/c"&+LOC16"-"&+LOC26"-"

> Symphony Version: +"{MENU}c"&+LOC1&""&+LOC26"""

Figure 1: Three formulas that create macro statements. Fach statement uses indirect addressing to carry out macro operations. The first two formulas will work in both Symphony and 1-2-3. Release 2.0. Separate versions are given for the third.

going to that cell and hitting F2 (Edit).

Moreover, when experimenting with this technique, be sure that the range uames (such as FRED, LOC1, and LOC2 in these examples) actually exist before you write the formulas. As is the case with aux formula, a reference to a nonexistent range name will make the computer beep, and you won't even be able to enter the for-

Note, too, that the contents of the

mula into the spreadsheet.

named ranges must make sense. In the first example, for instance, if cell A1 contains something other than a legal cell address. while you will be able to enter the formula into your spreadsheet, you will get an ERR display. Finally, be careful to use the auotation marks and ampersands correctly. Errors will prevent you from entering the

Notwithstanding such procedural caveats, this is indeed a powerful and versatile tool for macro writers.

QUICK COPIES

need to copy something several times. though not so often as to make it worthwhile to write a macro. The trick I use with 1-2-3 is to name the range to be copied with the name C. Having done this, I can very quickly copy the range to the new location by moving the cursor to that spot and typing

/cc<Enter><Enter>

This is faster and less error-prone than pointing, since I have to find only three keys.

SPREADSHEET CLINIC

You can demonstrate to yourself the advantages of this method with the following example: Enter a column of data in cells A5. A25. Try to copy this data to columns B, D, F, and H either by pointing or by typing in cell addresses. Then try it by calling the data C, moving the cursor to the new locations, and typing.

/cc<Enter><Enter>

each time.

Richard Aitkins Renton, Washington

There's no comparison. I'm a convert. And this technique will work for any spreadsheet that lets you name ranges and copy them.

UNDOCUMENTED NAME-KEY USE

According to the manual for 1-2-3, Releases 2.0 and 2.01, the only use for the NAME key (F3 on a PC) is to produce a list of range names. For example, /md<F3> will produce a list of range names, one of which you can delete by hisbliothine it and hittine farter.

The manual fails to mention that NAME can also be used with commel-NAME can also be used with commellike. File Retrieve and Print File that display a list of appropriate filenames that the third line of the control panel. Hitting F2 at that point will produce a complete disc, just as the File List command does. File size, creation with the command does. File size, creation with a command does. File size, creation with the cutsor to the file of your choice and then ting. Enter will complete the command for that file.

Why a description of this convenient feature was left out of the manual is anyone's guess. In any case, Figure 2 shows a typical screen that will appear after the /File Retrieve <F3> sequence.

Paul Padrutt Marion, Ohio

Yet another surprise from the boys in Cambridge! This trick works with all the File

pples 2	n Feb	Mar	Apr 269	Man
		246	269	May 292
ranges 1	14 114	150	143	124
Y	4 914	Vt/I	Yt/A	Yt.A
noles 2	16 423	669	938	1238
	14 222	372	515	639
	pples 21 renges 16		pples 288 423 669 renges 184 222 372	pples 288 423 669 938 renges 184 222 372 515

Copy this formula to renge F18..Jll.

mode.

Figure 3: A formula that speeds up year-to-date calculations commands that produce a list of files, so in | umn lett

the middle of a File Erase, Import, Coubine, etc., you can get a full list of files on disk along with their size and creation

To copy something several times, the trick

I use is to name the range to be copied with the name C.

data. Needless to say, if there are no matching files on the disk, hitting F3 will only make your computer been.

YEAR-TO-DATE TOTALS

When using 1-2-3, it's often useful to calculate running totals, such as those shown in Figure 3. Actual sales numbers are entered in cells F4 to J5. Year-to-date totals appear in cells F10 to J11.

There's more than one way to do this calculation, but the quickest is to use the formula in cell F10: @ sum(\$F4, F4). You can then copy this to any cell that will contain running totals—in this case, to cells F10 to J11. In cell F11, the formula becomes @ sum(\$F4, F5), in F12 it becomes @ sum(\$F4, F6), etc. Since only the col-

umn letter is absolute, you can copy the formula in F10 down as well as across.

Note that you must enter the formula without pointing. This is because 1-2-3 will not let you enter a mixture of absolute and nonabsolute addresses in pointing

Tracy Cassil Newton, Kansas

Yes, there are other ways to do this, the nost obvious being to sure the year-to-mote formula with the sum the year-to-mote formula with the sum they serve the first mouth's state figures. The formula in F10 would be +F4. The care in F11 would be +W4. Then using the cultined shows (et al. G10) would contain the formula for sumf\$\frac{1}{3}\$, \$\times \frac{1}{3}\$, \$\times \

SUPER MOUSE

The Microsoft Mouse comes with a program designed for use with 1-2-3. It makes the cursor fly across the screen, and filling in data is a breeze. While the mouse doesn't come with a program to use with SuperCale, the good news is that you can modify the 1-2-3 program to work perfectly with SuperCales!. The simple change required is shown in Figure 4.

After you save the change, rename the file to SC4.DEF. Then compile the file with the Microsoft Mouse program called MAKEMENU, so as to produce the file SC4.MMU. With these two files you will have a perfect working mouse interface for SuperCalc4 and will soon be just as spoiled as I am.

Robert Urbain Livonia, Michigan

Name of file to retrieve: A1*,vkl?

SALES-12.vkl 86-11-11 11:23 23465

SALES-12.vkl ADDIT.vkl PROJECT.vkl PROJECT2.vkl REPT.vkl

BUGGET-1.vkl BUGGET-2.vkl

An'i' for an'i'.



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SPREADSHEET CLINIC

The Microsoft file 123.DEF contains the interface for 1-2-1. Change line 36

rbl: MATCH 1,76,, "READY", SLASH, RETURN "READY"

"READY" rbl: MATCH 25.1.. "READY". SLASS. RETURN

Figure 4: The interface change required to make the Microsoft Mouse work with SuperCalc4 instead of with 1-2-3.

Mice are definitely an annising accessory. The one I personally prefer is the Logitech mouse, which also comes with a 1-2-3 interface. You can move, copy, and delete with it as it comes, and you can even prograin its keys for the spreadsheet commands you like best.

SPEEDING UP MACROS

With Release 2.0 of 1-2-3, you can use (windowsoff) and {paneloff} to turn off screen updating and speed up macro operation. You don't have that option in Release IA, but you can get some of the speed benefits by using windows. When your macro is about to start a lengthy routine with a lot of screen updates, make a window only one row deep at the top of the spreadsheet. Switch to the other, larger window, and move the cursor to a point in the spreadsheet where the screen is blank. Switch back to the small window and make that the active one in which the macro does its work. The screen will have to be updated only in that single line, and many macros will run much more quickly. Ralph D. Sappe

Poughkeepsic, New York

Instead of moving the lower window to a completely blank part of the spreadsheet. you might move it to a spot that contains a brief message explaining that the program is doing calculations and that it will return to normal soon.

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YESNO PATCH

The August 6, 1985, Power User column (Volume 4 Number 16) contained a patch to make Turbo skip the "Include error messages?" question. Mr. Joel Charbonler of Irvine, California noted (along with many others) that the patch does not work for version 3.01A. Figure 1 shows the required patches for the regular, the 8087, and the BCD versions of PC-DOS Turbo, Version 3.01. A number of other patches are available from Borland covering the various versions and operating systems (PC-DOS, MS-DOS, or CP/M 86). If you're really up to date and have already acquired Version 3.02, see the next item.

3.02 TURBO PATCH

Turbo Pascal always asks, "Include error messages?" when it starts. Since the answer is likely to be the same every time. many users like to patch TURBO.COM so that their preferred answer is automatic. However, the patch for previous versions won't work on Turbo 3.02A.

The DEBUG script below is for patching PC-DOS Turbo 3.02A.

a 2F			
mov	byte	ptr	[Ø34A],1
nop			
nop			

Type in the script using the Turbo editor. and don't omit the blank line after the third

	_			
	TU	RBO.COM 3.81x (PC-	DOS)	
Fils	Address	Old values	Nav for NO	New for YES
TURBO, COM	2F5E	Ed	24	#C
	2FSF	28	11	FF
	2260	80	EB	EB
	2F61	#D	16	12
	TUE	80-87.CDM 3.81x (P	C-808)	
File	Addrese	Old values	New for NO	New for YES
TURBO-87.COM	2A27	28	24	#C
	2A26	57	00	PF
	2A29	ER	EB	235
	2A2A	#O	1E	12
	TUI	WOOGCD.CDM 3.01x (P	C-00S)	
File	Address	Old values	New for NO	New for YES
TURBOB CD. COM	2E7F	28	24	#C
	2868	FF	88	77
	2 E E 1	DB	EB	275
	2E82	#D	18	12

Figure 1: Patches to eliminate the "Include error messages?" question for Turbo Pascal, Version

NOP or the carriage return after the final o. Save the script as YESNO.PAT. As shown, the script makes the answer an automatic YES. Change the final 1 in the second line to a 0 if you want to make it an automatic NO.

To use the script, first save a copy of TURBO.COM, just in case. Now type

DEBUG TURBO, COM < SCRIPT, PAT That's it. To patch TURBOBCD.COM,

change 2F53 to 2E75 in the first line and 034A to 037E in the second line. To patch TURBO-87.COM, change 2F53 to 2A19 in the first line and 034A to 0352 in the sec-

ond line.

Scotts Valley, California

Using a DEBUG script file, as Mr. Foley does, may be easier for some users than the straightforward DEBUG patching method shown in the previous item.

LARGE-SCALE SEARCH

Before coming to Turbo, I'd been using compiled Microsoft BASIC, which allowed me to create strings of up to 32,767 characters in length. Turbo's 255-character string-length limit was originally a dis-

appointment.

When I decided to write a text editor in Turbo, I was forced to use arrays of type CHAR. This presented a problem when it came time to write the search-and-replace procedures. Turbo allows you to find a string within a string (using the POS function), but how to find a string within an ar-

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■ TURBO POWER USER

```
(SR+,C-)
  str255 = STRING[255);
bigsrrsy = ARRAY[1..32767) OF Char;
  buffer : BigArray;
seerch : etr255;
result : Integer;
  FUNCTION pos_errsy(buffer : BigArrey; etsrt : Intsger;
finish : Integer; whet : str255) : Integer;
   (* To make the function ignore upper/lower CASE distinctions,
find each occurrance of the marker "(uc)" and replace it
with the TURSO function "UpCase" ")
                  : Boolesn:
                   : Byts;
      rest, P : Integer:
      found := Felse:
         re Length (what):
      WHILE (found = Felse) AND ((start < finish-L) AND (start > -1)) DO
            start := stert+L;
rest := 1;
            rest := 1;
WHILE Pos({uc}(buffsr(stert)), Copy(what, rest+1, L-rest)) > 8 DO
                           := reet+Pos((uc)(buffer(start)), Copy(what, rest+1, L-rest));
                   rest
                            : start-rest+l;
                   P 1= 8;
                        in P+l;
                   UNTIL (uc)(what[P)) O (uc)(buffer(atert+P-1));
                   IF P > L THEN
found := True
      ELSE etart := start+rest-1;

(if rest)# then)

(ED);

(ED);

(while (found-false) and (start<finish) do)

(IF found TREN poe_errsy := start ELSE poe_array := $;
                                               (procedure pos_array
    PROCEDURE test(S : str255):
            CEDURE explain(R : Integer);
          IF R > 0 THEN
            Writeln('Found string at position ', R)
            WriteLn('String is not present');
    BEGTE
      WriteIn;
WriteIn("Gearching for "', 8, '"');
Write("POS_ARAXY: ');
result := pos_array(buffer, 8, 32767, 2);
explain(result);
   DED:
    FillChar(buffer, SizeOf(buffer), #8);
mearch := 'Now is the time'; { Search string }
Hove(search[1], buffer[18888], Length(search));
   test(search);
test('The quick brown fox');
test('DOG');
```

Figure 2: A program to demonstrate Pos. Array.

ray? I wrote the Pos. Array function shown in Figure 2 to search a large character array for a particular string as fast as possible.

John P. Thien Milwaukee, Wisconsin

Mr. Thien's clever algorithm is faster for long strings than it is for short ones. If you are looking for a string of length L,

Pos. Array checks every Lth character in the buffer. If that character is contained in the target string, Pos. Array uses its position in the target to note where the target would have had to start for that particular character to fall where it did. If it does not find the target string starting at that point, it tries again.

For comparison, I timed Pos_Array



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■ TURBO POWER USER

ConInPtr := ofa(ConIn);

ConInPtr := StorePtr:

ReadLn(Itg); WriteLn(Itg,' / 18 = ',Itg div 18);

```
Searching for "Now is the time"
  POS_ARRAY: 8.66 seconds to find string at position 18888
DUMBPOS: 1.32 seconds to find string at position 18888
BLOCKPOS: 8.86 seconds to find string at position 18888
  Searching for "The quick brown fox"
  POS_ARRAY: 1.81 seconds to find that string is not present
DUMBPOS: 4.28 seconds to find that string is not present
BLOCKPOS: 8.86 seconds to find that string is not present
  Searching for "DOG"
  POS_ARRAY: 5.27 seconds to find that string is not present
DUMBPOS: 4.28 seconds to find that string is not present
BLOCKPOS: 8.85 seconds to find that string is not present
Figure 3: Comparative times for the three POS routines.
   Program Conin;
(by Neil J. Rubenking)
TYPE
      regpeck = RECORD
CASE Boolean OF
                            True : (AX, BX, CX, DX, BP, SI, DS, DI, ES, FLAGS : Integer);
Felse : (AL, AH, BL, BH, CL, CH, DL, DH : Byte);
      cher_set = set of char;
    CONST
       renge : char_set = [$8..$255];
apeciel : cher_set = [$13,$8];
AutoUpCase : boolesn = felse;
                       : regpeck;
: etring[88];
: integer;
       rega
       Line
         torePtr
                        : integer;
                        t cheri
      ver myCH : char;
BEGIN
       function ConIn : char:
          WITH rega DO
             BEGIN
                repeat
                   AH .m R.
                   MSDOS (regs);
                   myCE := chr(AL);
                until myCN in (renge + apecial);
          END;
IF AutoUpCase THEN myCH := UpCase(myCH);
          conin := myCE;
   RECTN
       Cirser;
       StorePtr := ConInPtr;
```

Figure 4: You can modify Turbo's Read and ReadLin procedures by changing their ConsoleInput routine.

Coninct :- vertourne, AutoUpCase :- true; Writeln('Snter e line -- regardless of chift keye, it will be upper case');

ReadEntLine)
AutoUpCase = false;
WriteLn('Enter a line -- now you can enter only numbers');
ReadEntLine);
ReadEntLine);
WriteLn('Num a "read(Ind.ch)" -- but only a number ber will

WriteIn('Now you can enter alphabetic keye only -- try it.'); range := ['e'..'e','A'..'2']; ReadIn(Line);

WriteLn('Now e "read(Kbd,ch)" -- but only e number key will do.');

Read(End.CCH), writeLn(CCB); Read(End.CCH), writeLn(CCB); WriteLn('Now enter an integer. Only number keya reepond, but you cen'); Write('etil go out of integer renge. ');

against a "dumb" werek routine and an in INLINE routine. The rerestits are shown in Figure 3. DumbPos simply scans through the array until it finds a match for the first character of the target string. Then it attempts to match each character of the target in turn. BlockPos., the INLINE routine, works exactly like DumbPos but is immensely faster.

Space considerations preclude listing the "dumb" routine and the INIINE routines themselves, though they are available as part of POSARRAY.PAS through the PC Magazine Interactive Reader Service.

INTERACTIVE INPUT

If your programs handle input interactively, you have to protect them from their users. Otherwise, someone will undoubtedly type "dog" where an integer was expected and crash the program. One protective measure is simply to disallow inappropriate keystrokes. You could do this by read-

If your programs handle input interactively, you have to protect them from their users

ing one character at a time and processing each character within your program, but there's an easier way.

Part of the power of Turbo's Road procedure is that it can take any number of arguments of many different types. Yet can it write procedures with this quality, that you can affect how Road gets this that you can affect how Road gets the standard identifier COLINFT: as an object within the code segment of the Console In-within the Console In

The function ConIn in Figure 4 is such a routine. It keeps reading characters from the keyboard, using interrupt DOS until it receives one that is in the set Range. You



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The sample screen display shown below is typical of what you see white editing a chart. Other screen dis-plays are provided for antering littles, changing

options, getting "help" and so on. STATUS BAR (not to be CHART WINDOW gives an overview of your chart; this example shows the "normal" view. "Close-up" view shows a smaller part of the chart in more detail. "Wide-angle" view confused with a wet bar) tells you what Interactive EasyFlow is doing at all times. shows a larger part of the chart all reduced size TEXT/MESSAGE WINDOW used to ente I Is entry valid "1 user text and to display sages from Interactive CURRENT SHAPE WINDOW - shows the content of the current flowchart shape (the one under the SHAPE CURSOR) in complete SHAPE CURSOR shows wh

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the chart. Cursor keys move it around; chart window scrolls if you run off the edge of the window CIRCLE 201 ON READER SERVICE CARD TURBO POWER USER

can control input by changing the value of Range. Also, if the Boolean flag AutoUp-Case is true, all input characters will be forced into uppercase. You can build on this simple example.

FASY LISTING

Most Turbo users seem to think that they must exit Turbo in order to list a program. Since DOS treats I PT1 like a file howey. er, you can simply mark your program (or any part of it) as a block and 'KW (write

 Most users think they must exit Turbo to list a program. Simply mark it as a block, 'KW it to LPT1, and it will go to the printer.

block to file) to LPT1. It will go to the printer. Note that Turbo will ask "overwrite?"; just answer "Y"

Bruce Gilham Los Angeles, California

You can also write to PRN. Note, however, that many printers don't print a line until they get a carriage return. Furthermore, to avoid losing the last line of your block, be sure to mark the block's end at the beginning of the next line.

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Neil J. Rubenking is a professional Pascal programmer.



User-to-user

Speed up disk accesses, smarten up print screens, shut down unwanted key repeats, and recover from irritating copy-protection problems.

THREE COMS

lems:

DOS can use all the help it can get. I wrote three small assembly language programs to help smooth out three separate prob-

(1) If you use your PC's floppy disk drives frequently, you probably spend a lot of time waiting for the disks to stop spinning so you can safely switch them. The memory-resident FASTOFF.COM program turns off the drive motor much more quickly than the standard IBM PC does. Normally the motors are turned off 37 ticks (about 2 seconds) after the last disk access. FASTOFF reduces this time by decrementing the clansed time counter twice as fast as normal.

A single byte located in the ROM data area is used to maintain the number of ticks remaining before the motor will be turned off. Part of the system timer's job is to decrement this byte and turn off the drive motor when the counter reaches zero. FAST-OFF uses the timer tick interrupt, which occurs 18.2 times each second, to decrement this same counter. Since this program addresses the ROM-BIOS data area, it will work on an IBM or a very close compatible only.

(2) It seems that after every print screen, the next step is always to take the printer off-line and press the form feed to eject the page. The memory-resident FFEED program will add a form feed character automatically after the print screen operation is complete. Since at times the form feed is undesirable. FFEED adds it only if the Right Shift key was used with PrtSc.

which occurs whenever the keyboard detects a Shift-PrtSc. It then tests the keyboard status to see which shift key is being held down. If it is the right one, then the FF | beginning the screen print. If the printer is

It works by intercepting interrupt 5, | character is sent to the printer when the screen dump completes. FFEED is also smart enough to check to

see if the printer is on-line and ready before

PASTOFF.ASH - TURNS OFF DISKETTE DRIVE MOTOR MUCE QUICKES -----ETOS SEC STABLISH BIOS SEC 100H JHP SHORT INITIALISE STARTS ? ;ORIGINAL TIMER INTERSUPT VECTOR ADDRESS CRICARG, DRIBTOR SE ADDRESSABILITY. CMP EYTE PTR MOTOR_COUNT,2 JB RETURN DRC RVTE PTR MOTOR COUNT JUMP TO ORIGINAL TIMER ROUTINE ************************************ CS:CSEG, DS:CSEC AX,350EB PERTUP TO GET OLD VECTOR MOV WORD PTR [ROW_INTS] ,EX SAVE OLD VECTOR OFFSET DK, OFFSET INTE SETUP TO CHANGE VECTOR AX,2500E DX,OFFBET INITIALISE POINT TO END OF CODE WE MEED TO KEEP

USER-TO-USER

not ready, the screen dump is aborted to prevent the keyboard from locking up. This is done by making a printer status call before giving control to the ROM routine. It's odd that such a simple check was not included within the standard ROM routine

(3) For a young child or an inexperienced typist, the auto-repeat feature of most keyboards may cause lots of unwanted duplicate keystrokes. The memory-resident NOREPEAT program eliminates the auto-repeat no matter how long a key is held down

It works by using interrupt 9 to examine each keystroke. Normally this detects when each key is depressed and when it's released. When a key is held down long enough to repeat, the keyboard simulates

NOREPEAT senses these unwanted duplicate keystrokes and then prevents them from being inserted into the keyboard buffer.

the key's being depressed again and again without being released, NOREPEAT senses these unwanted duplicate keystrokes and then prevents them from being inserted into the keyboard buffer. When the key is finally released, new keystrokes are again allowed to occur normally.

You can create these three .COM files by typing in the assembly language listings in Figures 1, 2, and 3, and then running them through the assembler and EXE-2BIN.

Tom Kihlken St. John, Missouri

These three programs are so short and sweet that we combined them into one master BASIC program (see Figure 4) that creates the trio. But heed Mr. Kihlken's caveat about experimenting with disk drive parameters on non-IBM systems!

, USED. IF , FRINTER ST	ATUS EEPORE	EAS USED, NO I BEGINNING PRI	TINT SCREEN IF RIGHT SHIFT BEY WAS TORE FEED IS SENT. ALSO CHECKS INT ECREEN AND ABDETS IF NOT READY
CSEG	ASSUME ONG	CS:CSEG 100H	
START	JEP SHE	RT INITIALISE	
OLDIETS.	DD	7	
,		,	UNUPT SERVICE ROUTIEE)
ESWINTS	PROC STI PUSH	FAR	
	PUSH	DX	
,	HOV	AS, 82 DX, 8 17H	CHECK PRINTER STATUS
,	TEST	AH.FEH	IS PRINTER READY?
,	31	RET	IF NOT READY, TAKE JUEP
,	NOV	AH, 828 168	SETUP TO GET KEYBOARD STATUS
	AND	DL, AL	LOOK AT EIGHT SHIFT BIT
,	PUSHF		
,	CALL	CS:OLDINTS	DO PRINT SCREEN PUNCTION
	JE	BL, S RET	INAS RIGHT SHIFT USED IF NOT DON'T SEND FORM FEED
,	MOV XDR INT	AX, BBBCH DX, DX 178	SEND A FF TO PRINTEE
,			
REY:	POP POP IRET	DX AX	ERTURE FROM INTERRUPT
NEW INTS	ENDP		THE STATE OF THE S
PROGRAM IN		(ROOK INTERN	
INITIALISE:	ASSUME NOV INT	DS:CSEG AX,3505E 2IE	SETUP TO GET OLD INTO VECTOR
	HOV	WORD PTR (OLI	DINTS), BX DIETS+21,ES
,	NOV	DX, OFFSET E	DELETS
	INT	AX, 2505E 21E	DOS FUECTION TO CHANGE VECTOR
,	NOV INT	DX, DFFERT II	SITIALISE SEYTES TO STAY RESIDENT
CSEG	ENDS	START	

```
HOREPEAT, ASE - DISABLES TYPHATIC KEY REPETITIONS
           SHORT INITIALISE
                                ; INITIALLY SET TO AN USED SCAN CO
             T 9 (REYBOARD ROUTIER)
                AL, CS:LAST_KEY
```

Figure 3: Assembler source code for NOREPEAT.COM.

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USER-TO-USER

```
CS:LAST_KEY, AL | NOW THIS BECOMES THE LAST KEY
                                          RESTORE THE STACK
SALLOW THE ROM TO PROCESS THE KEY
                      CS: [OLDINT9]
                      AL.618
                                           GET KEYEGARD STATUS
            MOV
                      AH, AL
AL, SSH
61H, AL
                                          JEST BACK ORIGINAL KEYBOARD STATUS
                                           RESET THTERRUPT CONTROLLER
                                           PRETURN PROM INTERRUPT
   HENTINTS ENDE
   PROGRAM INSTALLATION
            THEORY
   INITIALIZE
                       AX,3509H
            HOV
                                          ESSTUP TO GET OLD INTO VECTOR
                      21H
WORD PTR [OLDINT9], BX
WORD PTR [DLDINT9+2], ES
             MON
                      AX, 2509H
21H
                                          | SETUP TO CHANGE VECTOR
                       MOV
   CSEG
             ENDS
                       START
                                                                             (Forure 3 ends)
188 ' Program to create FFEED.COM, FASTOFF.COM, NOREPEAT.COM
118 CLS:PRINT "Checking DATA; please wait..."
128 FOR Bel TO 14:FOR C-1 TO 17:READ AS:IF C<17 THEN 148
138 Z=Z+VAL(AS)
148 NEXT : NEXT
158 IF 2=17482 THEN RESTORE:GOTO 188
168 PRINT "ERROR: CHECK THE LAST NUMBER IN"
178 PRINT "EACH DATA STATEMENT -- THEN REDO": END
```

```
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```

THE BOTT BEST CONTROLLED BY THE STATE OF THE

NOBYTES

Two fellow employees recently asked me how they could create a file 0 bytes long. They had accidentally deleted a similar file that was apparently part of a copy-protection scheme that required a zero-length file culled XS SYS.

The trick is to create the filename without a file. At first I thought it could be copied from the original disk, but most utilities can't copy a 0-byte file. I decided to create just the filename with no real file. After many failures, and completely by actident. I tried to redirect the output of a batch file to the XS. SYS file and it worked.

Use any .BAT file you happen to have handy, or create one by typing the following two lines, hitting the Enter key after each, and hitting the F6 key and then the Enter key when you're done:

COPY CON: TEST. BAT

Then type

TEST > XS.SYS (If you use the TEST.BAT batch file

above, you should get a "Bad filename" or "File not found" message; ignore it.) Now issue a DIR command and you'll

Now issue a DIR command and you'll see a listing for XS.SYS that is 0 bytes long.

Robert T. Collina Lake Hopatcong, New Jersey

There's a far easier way to create a zerolength file named XS.SYS. Make sure DE-BUG.COM is on your disk and type:

DEBUG XY.SYS

W

(Agaiu, ignore the "File not found" message.) Sigh. The things vendors do to try to make it hard for users.

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PC TUTOR



Serial dates via Turbo, eliminating double line feeds on a daisy wheel, dangerous debugging of hard disk directories, and new and old .EXE formats.

DIFFERENCES BETWEEN DATES

In Turbo Pascal I have used the interrupt SI function call SA to get the date from the system clock. This function call returns the year in register CX, the month in DH, and the day of the month in DL. In order to calculate the number of days between the current date and a fixed date, however, 1 meed to retrieve the date in the 12-3 format, i.e., where January 1, 1900, is 1 and December 31, 2099, is 7300.

Does the date in this format reside somewhere in my system where I can access it in Turbo Pascal?

Greg Schulte Springfield, Virginia

No. Lotus's representation of the date in this "serial number" format (as the munual calls it) is internal to 1-2-3. DOS does not provide this information. Even if 1-2-3 could get it from DOS, it would still have to convert other dates to the same format.

to the court values of unchanged primals and portable confined into the convert a day, numble, and year to a strid date, however. The only areally uness post of any date conversion function is dealing with leap years. As we know, yeard whishle by 4 are leap years, see except for years divisible by 100, which are 50 1900 is not are not leap years, except for years divisible by 400, which are 50 1900 is not eleap year, but 2000 is. Interestingly enough, 1-23 treats 1900 as a leap year, and Louis 3 format, you'll have to be consistent. Like presens, sumb the to the Consistent. Like presens, sumb the to the Consistent Like presens, sumb the consist

A demo progrum with this confunction is shown in Figure 1.

EXEMPLARY? EXECRABLE?

While 1 know that the extension .COM designates a "command" file, in the 4 years 1've used an IBM PC 1 have never found out what the .EXE extension stands for. Please tell me.

Richard L. Watson Affton, Missouri

Oddly enough, although I searched my entire collection of IBM and Microsoft manuals exhaustively, I found no clear statement about the meaning of .EXE. This must be one of those undocumented features of DOS that people are always talking about.

The .COM file extension comes from CPIM (now called CPIM-80, since it became an operating system for the 8080 microprocessor). PC-DOS 1.0 and 1.1 were heavily CPIM-based. In fact, the .COM file formats of CPIM and PC-DOS (includ-

ing the Program Segment Prefix that DOS builds when it loads a COM file) are virtually identical. For software developers, this similarity helped ease the transition to the PC. Programmers could ignore the 8080 segment registers and have access to 64K of program and data space, just as they had had under CPIM.

The .EXE format is native to PC-DOS and can support program files larger than the stack, each of this polluting different segments to be defined for code, data, and the stack, each of which can be 64k flong. Programs in .EXE format may contain explicit in the .EXE file has relocation information that DOS uses to resolve these references is or resolve these references.

The COM file format will eventually be phased out as DOS evolves, and the .EXE format will undergo some changes. Indeed, there are actually two .EXE file formats already. The "old" format is docu-

```
program DateDomo ;

function SetalDate (year, month, day; inneger) ; real;
const monthlys; merroy [1:.12] of integers;
year, date ; real;
year, date ; real;
year, date ; real;
if (year, mod t, mod | footh | footh | footh |
if (year, mod t, m) end | footh | footh |
if (year, mod t, m) end | footh | footh |
if (year, mod t, m) end |
if (year, m)
```

Figure 1: A Turbo Pascal program with a function that converts a year, month, and day between 1900 and 2099 to the serial format used by 1-2-3. This program reproduces a 1-2-3 error in assuming that 1900 is a leap year.



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mented in the DOS Technical Reference manuals and has remained the same over the years. The "new" .EXE format puts more information in the header section and is currently used in applications that run under Microsoft Windows. Microsoft seems to be indicating that this new .EXE format will also be used for programs that can run under 80286 protected mode in a future version of DOS. (The linker that

■ The "new" EXE format puts more information in the header section and is used in applications that run under Windows.

comes with the Windows Software Development Kit to create these new .EXE files is called LINK4.)

The two .EXE formats are related, as you'll see if you execute a Microsoft Windows application under the current versions of DOS. DOS doesn't know anything about the new .EXE format, so it ends up executing a separate tiny program (imbedded in the .EXE file) that simply prints the message 'This program requires Microsoft Windows" and terminates. Windows, however, knows that the header has more information and can thus determine where the real program actually begins (as well as many other things).

This bit of compatibility between the old and new .EXE formats is rather clever because the Windows application doesn't actually have to check that it's running under Windows. DOS executes the tiny embedded program simply because of its knowledge of the structure of .EXE files. Cute, isn't it?

Oh, by the way, .EXE stands for executable"-whether it's documented that way or not

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The article "Keeping Your Files Private" (PC Magazine, Volume 5 Number 16) describes how DEBUG can be used to turn



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■ PC TUTOR

on the "hidden" attribute of a file or directory on a floppy disk. How can I modify this command if I want to hide a directory on my hard disk?

RODUCTIVITY

Ed Guttman Canton, Michigan

I do not recommend using DEBUG ta alter directory informatian. It's not sa bad with a floppy disk because the worst that can huppen is that you lose 360K af data. With a hard disk, however, you could lose . . . well, how big is your hard disk? There is just too much that could ga wrong when you use the DEBUG L and W commands ta . modify disk sectors.

Even if I wanted to give you the DE-BUG command that would load and write the hard disk directory, I could not tell you the sector where the root directory begins. For hard disks, the root directory does not begin a specific sector. Its starting point depends upon the size of the hard disk, the size of the DOS partition, and whether the file ullocation table contains 12-bit at 16bit cluster eutries.

The DOS function call that reports the starting sector of the root directory has nat been documented by Microsoft. (However, readers interested in some unofficial documentation of this function call cun consult "Diskscan Finds Bad Sectors" in the Programming/Utilities column of PC Magazine, Valume 5 Number 8.)

Even with this information, however, vau can find the location of only the root directory. Subdirectories may be anywhere on the hard disk. You would have to find the starting cluster number of the subdirectory from the root directory, canvert that to a sector number, and then laad that sector into DEBUG

As the Editor's Nate in the "Keeping Your Files Private" article indicates, a much better method far changing file attributes is ATTR, a pragram presented in Valume 5 Number 11 and available an the PC Magazine Interactive Reader Service bulletin board. You can dawnload the pragram for your own use without charge, via modem, by culling (212) 696-0360 If I've convinced you nat to use DE-

BUG for this job, yau definitely do not wunt to read the following few paragraphs. I'm gaing to tell you haw to do something that I dan't want you to do.

■ PC TUTOR

To modify the root directory on a hard disk directly, you must first determine the location of the root directory. You can do this with information from the boot sector, which is sector 0. (This information may not appear on a disk that is not bootable or that uses its own driver files.) Load sector 0 of the hard disk into DEBUG with:

L 100 2 0 1

The 100 is the memory address where the sector is to be loaded, 2 refers to drive C, 0 means sector 0, und 1 meuus "reud 1 sec-

tor ' Now do a DEBUG D command. The 2 bytes at offset 10Eh are the number of "reserved sectors" and will probably be 1. (Remember to switch the order of the 2 bytes to convert them into u word.) The single byte ut offset 110h is the number of the file allocation tables (FATs). This will probably be 2. The 2 bytes at offset 116h contain the number of sectors per FAT. On my 30-megabyte hard disk this is 3Dh, or 59 in decimal. (Your hard disk may be different.) Multiply the number of FATs by the number of sectors per FAT. Add the number of reserved sectors. For my hard disk, that comes out to 7Bh. That is the sector where the root directory begins.

The six of the root divectory cus be caulated just as easily, though remomber I told you that you don't want to do thit. The number of root directory entire is the word at offset I I Ih. For most hard disks. It is not shown that the six of th

(The information on the layout of the boot sector is documented in the DOS Technical Reference manual in the section on device drivers.)

You can load the root directory into DEBUG with the commund

L 100 2 7B 20

You should use the number you calculated for the starting sector of your root directory instead of the 7B above, and the number

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■ PC TUTOR

you calculated for the length of your root directory instead of my 20. After you do this you can see your entire root directory by executing

D 100 L 4000

If you're still with me here, you can follow the directions given in "Keeping Your Files Private" for modifying the attribute byte of a file or directory. When you're done, take a deep breath and type carefully

W 100 2 7B 20

again substituting your own calculated values for the TB and 20. Notice that the W and L commends shown here use the same parameters. That's the easiest and safest way to make sure that what you loaded from the disk gets written back to the same place.

Again I emphasize that using DEBUG to modify any disk directly is dangerous if you value the data on the disk. If you try it anyway and mess up your disk, it's your own fault. [Besides, ATTR.COM does the job much more easily.—Ed.]

USING THE TANDY DAISY WHEELI I Several readers have let me know that there is a better way to prevent the double line feed problems when using the Tandy Daisy Wheel II (PC Tutor, Volume 5 Number 17). The printer has a control sequence to turn anot-line-feeding off. You can do it in BASIC with the statement LPPLITT (FIRST 271 + CHRS (271).

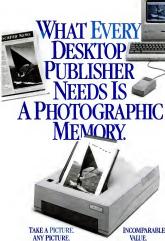
Diffini Ging(E)) . Ging(E)

Oue reader said that Radio Shack has an LPPRRY SSS driver that fixes the problem. Either solution is simple enough, but it's not the whole story. A Daisy Wheel, with a serial number before 130/10/63 requires a new ROM chip (part number MAX-4805-66-1158, \$30) before this control sequence will work. I thank everyback who wrote me about

this and I'm glad there's a better way around the problem than the kludgy solution I came up with.

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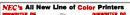
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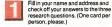
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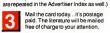
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HOW TO STAY ON TOP OF WHAT'S WHAT IN THE PC MARKET

Are you frequently called upon to give advice about PC products? Is it your responsibility to make PC hardware, software and periphatical erals selections?

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MORE OF THE RIGHT PEOPLE The research is coming in and its message is clear:

PC Magazine is being read regularly and trusted by more of the right people. And with a circulation of 375,000—the largest and fastest growing in the field-that's a lot of right people.

in surveys conducted by Market Probe International, Inc., a wellknown independent research organization, customers obtained from lists of three hardware and software vendors identified PC Magazine as the publication

they read most regularly.

Market Probe was also asked to survey six PC user groups across the country. These groups, founded to provide support and encourage communication among PC users. number many of the country's most influential and knowledgeable purchasers among their members. Once again the results are in and the answer is the same

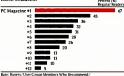
In Washington, D.C., Houston, New York City, Silicon Valley, St. Louis and Indiana/Kentucky user group members ranked PC Magazine as the most regularly read publication.

In all nine studies, when asked to rate the magazines

they read regularly, buyers and user group members consistently rated PC Magazine highest for in-depth, objective product reviews based on actual lab tests. They know only too well how difficult it is to make good product choices for their companies and organizations in the fast-moving PC market-and who provides the guidance that makes the difference.

Regular Readership Scores— Buyer/User Croup Studies.

Here are the averages across the nine studies:



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COMING UP

EGA AND MULTISCAN MONITORS In the year since our last color monitor roundup, new EGA and multiscan monitors have proliferated at an amazing rate. The NEC MultiSymc, once the unchallenged King of the Hill, is meeting some stiff competition. We review 17 of the strongest challengers.

SMALL-FOOTPRINT PC: The thinking used to be that if your PC didn't look like an IBM it couldn't be as good, and if it was smaller than an IBM, forgot it. These days, good things are coming in smaller packages. Winn L. Rosch looks at smallfootprint computers, both PC and AT class, from Tandy, Hewlett-Packard, Epson, Olivetti, TeleVideo, Leading Edge, and PC's Limide.

MAILING-LIST MANAGERS Getting rid of the drudgery of maintaining mailing lists is the job of these 25 programs, ranging in price from \$12 to \$295. Barbara Krasnoff and Bruce Brown put them to the test.

REMOTE COMMUNICATIONS M. David Stone looks at Carbon Copy, PC Anywhere, Remote, and Close-Up—communications software that lets you operate your PC remotely or run the same program at two sites simultaneously.

EMULATING EXPANDED MEMORY You don't necessarily have to buy an expensive expanded memory board to make room for those extra-large spreadsheets. Charles Petzold reviews five programs that can emulate expanded memory, and all of them do it for less than \$90.

THE INVISIBLE NETWORK Frank J. Derfler, Jr.'s year-long connectivity series continues with a comprehensive review of Invisible Software's Invisible Network system and a comparison of its ments with those of AT&T's StarLAN and Fox Research's ILNET.

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